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Electrical Manufacturing in Russia.

WITH the opening of the new financial year in Soviet Russia particular attention was devoted, in all branches of the State monopolised industries, to the programmes which have been prepared for developments in 1925-26, and even in the next five years, for which plans have in some cases been drawn up.

In these deliberations the electrical manufacturing industry, as well as the supply branch, has occupied a prominent position. Judging from the information available from Soviet sources, and recorded from time to time in the columns of this journal, and from the fact that orders are known to have been placed for electrical machinery and plant both in this and other countries during the past two years or so, it is certain that progress is being made in the supply industry and in the manufacturing branches, even if many statements emanating from Soviet circles have to be accepted with some reserve.

The Board of Trade recently issued a report from the British Commercial Mission in Moscow giving a survey of the coal mining industry in Soviet Russia, which has been accepted as an authoritative document. Yet the only information available to the British Mission, as well as to the other trading missions in Russia, is that which is furnished by the Soviet Government and published in the official newspapers, and from this point of view the commercial missions in Russia could just as well fulfil their duties in London and other European cities in this respect, without the large expenditure necessary for the maintenance of these organisations abroad, and that, too, with a greater measure of personal convenience and comfort. Little information or statistics can be obtained from private sources, and the convictions and punishments occasionally meted out to Russians found guilty of what is termed "commercial espionage," as, for instance, those which recently took place at Kharkoff in the matter of the coal and iron and steel industries, are sufficient to prevent any repetition of these cases which, after all, only amounted to the giving to former foreign owners of a little information, in return for the payment of a few roubles, respecting the condition of mines and iron works.

Though little information is, as we say, available from Russian sources, British electrical concerns which are finding ways of doing business with Russia have first-hand proofs of the electrical progress that is actually taking place. The Metropolitan-Vickers Co. and associated concerns have long been in actual touch with the market, as our pages have shown, and it was Sir Philip Nash who, eighteen months ago, advocated an extended and particular application of Export Trade Facilities Act accommodation for concerns which found the risks too heavy to carry unsupported. It was with great pleasure that we reported in our last issue that Captain R. S. Hilton, of the same company, referred to a recent visit that he had paid to Russia (six weeks previously, as a matter of fact) when he discovered, to his astonishment notwithstanding all that has been reported in these pages, that they were developing their sources of electricity supply in a most wonderful manner.

The Russian electrical industry is confronted with three distinct problems. In the first place, the Central Electrical Trust and the Leningrad Electrical Machine Trust, which, as mentioned previously, were to be consolidated, have now actually been amalgamated as from October 1st under the title of the Get or State Electrical Trust. In this connection Mr. H. N. Milshtein, one of the directors of the enlarged trust, is reported to have stated at the beginning of this month that the union of the two heavy electrical engineering trusts coincided with the time of increasing the load on the works embodied in this trust to the limits of their technical possibility. The second problem relates to the proposed great extension of the manufacturing industry, and the third concerns the utilisation of foreign experience in the promotion of the scheme of expansion. Mention has previously been made of the intention of Russian electrical engineers to seek the aid of foreign works, and in this respect they have already availed themselves, to some extent, of the services of Swedish firms.

Apparently the turn of the Germans has now arrived, as was briefly mentioned in our "Business Notices" a fortnight ago. According to statements emanating from Berlin, negotiations have been proceeding for some weeks past between representatives of the Russian electrical trust and the Berlin A.E.G., and these are said to have resulted in the reaching of an agreement in principle. Under the agreement—which seems to resemble those between the German company and the General Electric Co. of New York of the pre-war period, renewed in the post-war period—it is proposed to place at the disposition of the Russian trust the technical experience and patents of the A.E.G., and it is said that the General Electric Co. of New York will probably participate in the arrangement. The Russians also intend to enter into an agreement with the International Glow Lamp Trust, for which negotiations are now proceeding. Besides the technical agreement, the Russians desire to conclude one in regard to the deliveries of machinery by the Germans of the value of £2,000,000, but some difficulty is being experienced in the matter owing to a credit of several years being asked for by the Soviet interests. It is stated that in A.E.G. circles confirmation is forthcoming of the conclusion of the technical agreement, although the signatures of the representatives of the Russian Government have yet to be appended to the documents.

Coming now to the electrical engineering industry, which has been investigated by the electrotechnical section of the special conference in Moscow, the section has made it quite clear that the absorbing capacity of the market in the next five years will grow to four times the pre-war capacity. At the end of that period the home production is expected to be covered to the measure of 80 per cent., so that it will be necessary to increase the producing capability of the works from the rate of 100,000,000 roubles, which was the annual rate on July 1st, 1925, to 320,000,000 roubles (£32,000,000) per annum in 1930. The only manner in which this development can take place is by the construction of new works and the undertaking of bulk production, especially of machines. In view of this fact, a beginning has already been made by the extension of the "Dynamo" works, which is specialising in tramway and crane motors. At Kharkoff the former Gerlyach Pulst Works is being united with the former Vek Works, and the construction of standard machines will be organised there, while at the same time the foundry is to be enlarged and all the extensions finished in two years. The production of transformers is to be concentrated at the Provodnik Works in Moscow, and the output from other works will be discontinued.

A big programme of construction is to be carried out in the low-pressure industry in Leningrad and Moscow in 1925-26. Besides these, almost all the other producing works will be considerably extended as, for instance, the Electric Carbon Works, which will then also turn out carbon brushes, and the Svetlana lamp factory. In 1926-27 the second stage is intended to be embarked upon, when works will be established in Leningrad for the production of materials, works for the manufacture of high-pressure insulators in Moscow in substitution for the old Isolator Works, and a factory for the manufacture of carbon electrodes. The capital expenditure on the extensions contemplated in 1925-26 will have the effect of increasing the productive capacity of the works under the control of the General Electric Commission from 86,000,000 roubles to 141,000,000 roubles per annum. The capital outlay proposed in 1925-26 amounts to 21,600,000 roubles.

Of course, the execution of the programme for the year depends upon whether the money required is or is not placed at the disposal of the industry.

The I.E.E. Presidential Address.

The address with which Mr. R. A. Chattock read himself into the presidential chair at the meeting of the Institution of Electrical Engineers last week was one of the shortest that we have heard, and one of the most spirited. As he has plainly shown during the past twelve months, he has no liking for the proposals which, it is believed, are to be brought forward by the Government next month, and he took the opportunity offered by his inaugural address to give reasons for the opinions which he holds. The principal items in his speech were the advantages of pulverised fuel, the necessity of improving the load factor on electricity supply undertakings, the interconnection of power stations, the standardisation of frequency, and the training of electrical engineers. On almost all of these points we are glad to find ourselves in full agreement with Mr. Chattock.

Almost exactly a year ago, commenting on a proposal of Mr. J. H. Ellis, chairman of the Plymouth Gas Co., that electricity works should go hand-in-hand with gas works, with the conservation of coal as their common aim, we pointed out that the increasing use of pulverised fuel was a long step in that direction, and that the solution of the problem might involve the carbonisation of coal at a lower temperature than was customary. A similar proposal by a gas engineer, Mr. R. Gray, of Hamilton, is reported elsewhere in this issue. On various occasions we have returned to this subject, and it is interesting to find that Mr. Chattock, who has adopted pulverised fuel for recent boiler extensions, is emphatically in favour of its use on the grounds of economy in capital cost and operation, and of the possibility it presents of utilising the refuse heaps of collieries; like Mr. W. B. Woodhouse, in his presidential address last year, he has given serious attention to the question of coal distillation and by-product recovery, and whilst he repeats his predecessor's warning regarding the market price of by-products, he is attracted by the system of carbonisation of pulverised coal, yielding fuel in powdered form ready for combustion in boiler furnaces, which we recently described—subject to its proving satisfactory.

With regard to load factor, Mr. Chattock points out the necessity, which we have frequently emphasised, of improving the load factor by the adoption of a two-part tariff to encourage domestic uses, by railway electrification, and by securing other long-hour loads. But he agrees with our contention that no improvement in

load factor is likely to result from the interconnection of distant power stations, which usually possess load curves of similar configuration, and he cites American experience in support of this view.

The subject of interconnection Mr. Chattock treats as inseparable from that of standardisation of frequency, which is an almost indispensable preliminary condition, and, we take it, would not be pressed if the question of interconnection did not arise. Mr. Woodhouse last year pointed out the disadvantages of interconnecting distant stations; Mr. Chattock goes further, reminding his audience that local generating stations are now highly economical, and to derive any large proportion of the supply from a distant station would entail heavy capital cost without increased economy. As we have previously pointed out, the concentration of plant involves increased outlay and loss of energy in mains, and where the load curves are similar, the interconnecting mains merely take the place of stand-by plant, which can be more economically provided where it is wanted. Moreover, it is impracticable to tap such mains without the use of very costly switchgear and regulating apparatus; an interconnecting main is a feeder, and cannot at the same time be a bus-bar. These facts were emphasised by Mr. Chattock. The interlinking of adjoining stations is a different matter; as we have stated, it involves no great outlay, whilst its advantages are unquestionable, and Mr. Chattock fully approves of this.

With regard to the standardisation of frequency, we have propounded the view that this would be desirable, though not essential except for the purpose of interconnection; it would reduce the cost of a.c. apparatus, and do away with the flicker that occurs in lamps fed from a 25-cycle supply. Mr. Chattock may well be excused for minimising the importance of these questions, in view of the fact that the huge Birmingham undertaking is mainly dependent on a 25-cycle system, and that to convert it to 50 cycles would involve an immense upheaval; and he gives figures indicating that the cost for Birmingham alone would be nearly seven millions sterling, and for the whole country the colossal figure of 27 millions. Whilst we adhere to the opinion that a uniform frequency of 50 cycles for public supply would be decidedly advantageous, we feel that if his estimates are correct the outlay is out of all proportion to the benefits that would accrue from it.

Finally, we welcome Mr. Chattock's comments on the training of electrical engineers, which are in close accord with the advice that we have given from time to time to the many parents who appeal to us for guidance.

The British Industries Fair.

Manufacturers may perhaps be pardoned if they complain that they have had more than their fill of exhibitions, for it must be admitted that this somewhat expensive form of publicity has been heavily run on during the past year or two. There are many reasons why firms of a certain standing must often participate in these displays, but it is certainly a fact that results are not always satisfactory, although it is practically impossible to make an accurate appraisal of the results of an exhibition, some of them being of a very indirect nature.

We would, however, once again draw our readers' notice to an exhibition which is very different from the majority, namely, the British Industries Fair. As the principal aim of this Fair, which is of an official character, is to bring large buyers into direct contact with manufacturers, the results are more tangible, although it also brings in its train orders which cannot definitely be linked up with it. It may be said that practically every visitor to the Fair is a potential buyer; whereas at an ordinary exhibition mere sightseers are in the majority, often to the detriment of business.

There is no doubt that this is realised by many important firms which are to be seen year by year at their stands in the Castle Bromwich Aerodrome, Birmingham, or the White City, London. It may be taken as certain that these firms do not take space so regularly from pure altruism. They evidently derive some advantage from their participation, and this would appear to indicate that other firms stand a good chance of securing business in the same way.

Hitherto the electrical manufacturing industry has not been represented at Birmingham upon the scale which its importance justifies. The Fair has given an opportunity to many of the local firms to display their wares, and upon the whole these firms have seized it in a commendable manner—no doubt with corresponding benefit to their business. But while expressing our appreciation of the efforts of these firms, we feel bound to say that the electrical industry of this country should be more thoroughly represented at the Fair, and we urge manufacturers to study the matter and, if possible, to take a hand in this important means of fostering our export trade.

In any consideration the encouragement given by the Government should be borne in mind. A sum of £25,000 is being utilised for the sole purpose of propaganda for the Fair, and 75 per cent. of this will be spent on advertising the Fair abroad. Potential buyers from overseas are aided in a number of ways—another excellent feature of the organisation—and the whole of the commercial, diplomatic and consular service assists to make the Fair and its objects known in all parts of the world.

It is satisfactory to learn that applications for space are being received at a rapid rate; we advise British electrical manufacturers to apply in good time.

The Society of Technical Engineers.

The formation of a Staff Benefit Society under the ægis of the Engineering and Allied Employers' National Federation has had an unfortunate result as regards the "Third Party in industry." It appears that the rules of the new Society include a condition that none of its members shall belong to any professional protective association, which would, of course, exclude the members of the Society of Technical Engineers from participation, and a protest addressed by the secretary of the S.T.E. to the Federation, pointing out that this provision was in effect an official ban on membership of his Society, met with a cold reception. Consequently the Executive Council of the S.T.E., on Saturday last, unanimously adopted the resolution which is recorded amongst our "Notes" to-day (p. 708). A second resolution was adopted as a rejoinder to an attack made by the Trade Union Congress last month upon the "Third Party" movement.

It is true that staff organisations exist which have joined hands with the manual trade unions, but this does not apply to the Society of Technical Engineers, which has explicitly forsworn the use of the strike as a weapon, has kept outside the Labour movement, and has pledged itself always to promote the interests of industry in general—"to seek peace and ensue it." This policy apparently appeals neither to the employers nor to the Trade Unions, doubtless on the principle that he who is not for us is against us; the S.T.E. refuses to ally itself with either side, and consequently both sides regard it askance.

We believe, however, that they are both mistaken, and that the Society of Technical Engineers will prove to be sincere in its desire to work for peace in industry. Occupying, as its members undoubtedly do, an intermediate position between the employers and the manual workers, they are admirably situated to mediate between them, to convey to each a lucid and impartial presentation of the other's case, and in some measure to mitigate the disadvantages suffered by the engineering industries through the want of a Whitley scheme—all this, of course, apart from the services rendered by the Society to its own members. We sincerely hope that the Engineering Employers' Federation will not assume a hostile attitude towards the S.T.E., which would not only be, we think, unjust, but also ill-advised.

Electrical Developments in Finland.

The Inimitable Imatra.

By THEODORE STEVENS, M.I.E.E.

"The most beautiful waterfall in Europe" is in the hands of the engineer, but lovers of Nature's beauties are not to be deprived of their enjoyment of Imatra for

Fig. 1.—The Rapids of Imatra, Half a Mile in Length.

many years, because the volume of water is so great that the whole plant that is to be installed (construction will occupy two years more) could be run at full load

Fig. 2.—The Wallinkoski Rapids.

during minimum flow with a surplus in the narrow river bed of two hundred tons per second. The drainage area is 23,000 square miles, and the run-off, equivalent in a

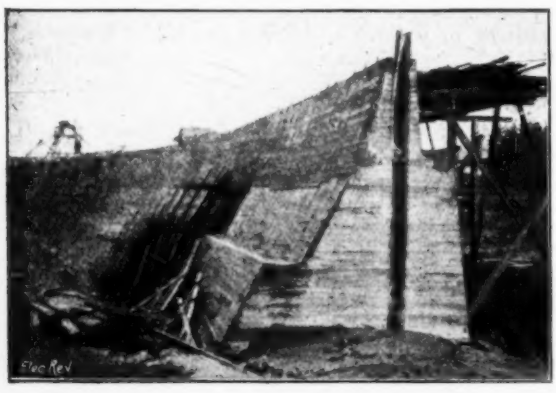


Fig. 3.—Incomplete West Wall of Head-race.

year to less than 12 inches of rainfall, does not vary more than 20 per cent. from the average of 20,000 cubic feet per second.

The River Wuoksi has ten consecutive rapids between Lake Saima and Lake Ladoga. Of three relatively small water-powers in existence, two will disappear when the level of the head-race water is raised.

If the time ever arrives when the whole flow is diverted from Imatra rapids, Wallinkoski, the next rapids south of Imatra, will be "the most beautiful in Europe."

To appreciate the reason for this moderate interference with scenic beauty, which Finlanders and everyone who visits it appreciate, the power situation throughout the country must be examined. In Finland there are hundreds of small water-power plants (30,000 h.p. total

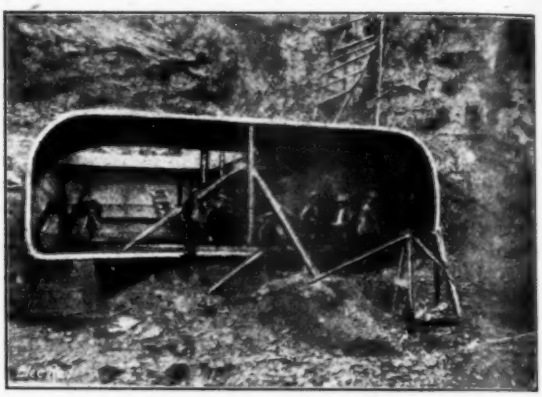


Fig. 4.—Discharge Outlet of First Set in place, Aug. 21st, 1925.

of less than 50 h.p. each), and 200,000 horse-power total in 165 plants, of over 50 h.p. and up to 16,000 kVA. In addition, there is a quarter million horse-power in various types of heat engines.

Many networks of transmission lines at voltages up to 70,000 V connect some of these 165 plants into groups, one having twelve plants interconnected. A careful examination of a large-scale map of these transmissions,

Fig. 5.—Excavation for Tail-race.

totalling 4,600 miles, reveals no point on any network more distant than 26 miles from a generating station.

A quarter of the area of Finland is comprised in four districts (*viz.*, Viborg, Nyland, Abo, and Tavastehus), where 60 per cent. of the total population live and where 90 (of the 165) plants are situated. From Imatra in the east to Abo on the west coast power from Imatra will be transmitted 240 miles at 110,000/120,000 volts and suitably interconnected with most of the existing networks in those four districts, supplementing their power. When this is complete, no plant on the network will be more than 30 miles from a generating station.

Finland's area is nearly 150,000 sq. miles; of this 17,000 sq. miles is covered by inland waters; 100,000 sq. miles by forests; 7,200 sq. miles are arable land (1910 census); and 3,700 sq. miles are under pasture. The population is nearly 3,500,000, and 224 kelvins are consumed per annum per head of population. Nearly

Fig. 6.—Wuoksi River at Normal Level; Head-race on Left, Showing Raised Level.

3,000 miles of railway and 20,000 miles of high road provide means of transport.

For comparison, the British Isles, with fourteen times the population on 81 per cent. of the (Finland's) area, consume 66 per cent. of the kelvins per annum per head that Finland consumes.

The Government decided in 1921 to develop part of the power of the Imatra rapids and to interconnect the new station with existing stations in the south of Finland. The diversion works at Imatra are straight in plan, nearly 300 ft. wide and 2,400 ft. long; 80 ft. head will be utilised. 800,000 cubic yards of earth and 300,000 cubic yards of rock must be moved. The works are estimated to cost £10 per installed horse-power at the present extraordinary rate of exchange of 193 marks to £1 (25 was the normal value). Sluice gate works are under construction, and when these are completed the river water will be passed through them whilst revolving gates are built over the present river bed. The power-house site is visible in fig. 5, and fig. 4 shows the outlet end of the first 27,000-h.p. set in its final position. Three sets of this size will be installed by 1928. The ultimate capacity of the site, which lends itself to storage, is about 250,000 h.p.

The existing low-head water-power plant at Linnankoski (fig. 7) will be submerged when the Imatra plant is completed, since it stands below the contemplated level in the new head race.

The following works of reference may be useful to the interested reader:—

Helsingfors: "Finland's Water Power and Electric Transmissions." Georg Christiernin. "Some Aspects of the Geography of Finland." Dr. Ragnar Numelin. "Water Power Resources of Finland." Dr. Edv. Blomqvist.

Fig. 7.—Linnankoski Power House, which will be Submerged.

London: "Lectures on Finland." Mrs. Aino Malmberg.

Electro-Farming.

Intensive Illumination on a Market Garden.

By R. BORLASE MATTHEWS, Wh.Ex., A.M.Inst.C.E., M.I.E.E., F.R.Ae.S.

Artificial lighting has been employed to hasten the growth of plants by different experimenters at intervals from the year 1775. At the Paris Exhibition of 1900 the writer had the opportunity of inspecting the effects of electric lighting on plants through glass of various colours and again in 1906 he was privileged to observe the experiments at Schenectady carried out by the late Dr. Steinmetz with mercury-vapour lamps. Until the last few years all work in connection with the artificial illumination of plants has been carried out with light of ordinary intensity. However, during the latter period, a considerable amount of research has been conducted in America with very intense illumination; in particular some very interesting work has been carried out by Dr. R. B. Harvey, of Minnesota, on the growth of plants entirely in artificial light. Many plants were grown from seed to seed, in the continuous light obtained from 200-watt and 1,000-watt nitrogen-filled Mazda lamps, used, of course, in conjunction with suitable reflectors. The same system has been applied more recently to the growing of grass on golf greens, which received world-wide publicity in the newspaper Press. As the results of these recent experiments seemed to show a great deal more promise than those performed with ordinary illumination in earlier days, the writer decided to carry out some work in this connection at East Grinstead, and obtained some very interesting results. 1,000-watt Mazda lamps and suitable reflectors, two feet in diameter, were used for this purpose. The lamps were placed three feet above the level of the tops of the pots which contained the plants under treatment. The tests were carried out on the ordinary plants which are usually to be found in greenhouses associated with a garden of fair size. In every case the progress of the plants was most remarkable. Daffodils and Lent lilies, when placed under the light for six hours a night, flowered in four days, growing about three-quarters of an inch a day. Narcissi flowered in seven days. In

each case, the plants were placed under the light when the buds were just beginning to form. The control plants placed away from the light took four weeks to flower. These experiments were carried out in rather an empirical manner, as the chief object was to obtain a general idea as to the value or otherwise of intensive illumination. From a scientific point of view they were entirely satisfactory, but the work would have been costly from the point of view of electricity consumption, if it had not been for the fact that the electricity supply on the writer's farm is generated by water power. By means of a self-winding automatic time switch, the lamps were switched on at midnight and off at six a.m., *i.e.*, the current was used for lighting the plants when not required for any other purpose. Further, the use of the time switch made certain as to the exact period during which the light was on.

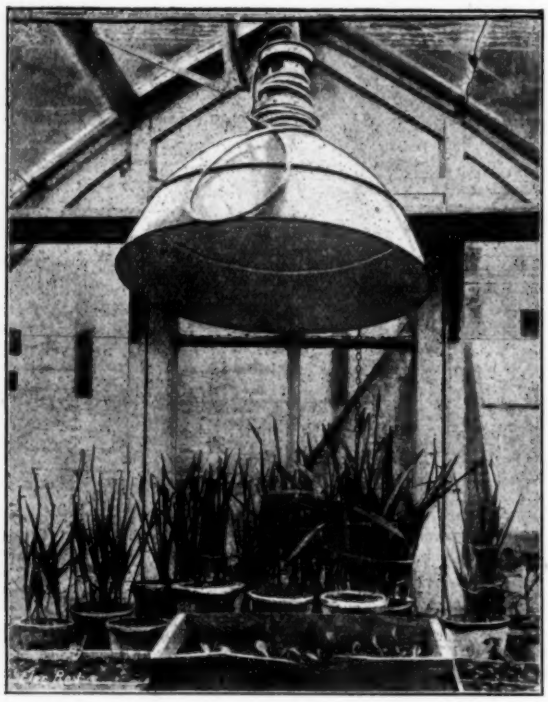


Fig. 1.—Reflector used for Illuminating Plants.

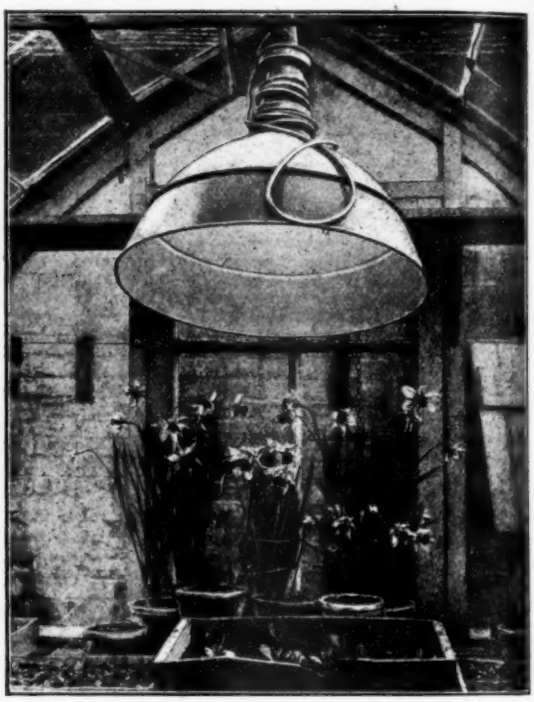


Fig. 2.—Four Days later—the effect of Artificial Illumination.

Since to obtain this very intensive illumination the lamps have to be placed so close to the plants, the number of plants that can be lighted at a time is necessarily very limited, which means that the cost per plant, even at one penny per unit, is very high, in fact, too high, except under special circumstances such as to enable a market gardener to get some plants forward for Christmas or Easter or other times when the public are prepared to pay extraordinarily high prices for them. For certain scientific purposes, such as seed breeding, cost is of small importance. In America, by this means, it has been possible to obtain four crops of wheat in one year and thus in that period it has been possible to establish the fixedness or otherwise of a new breed of seed, instead of having to wait four or five years. As is well known, in the breeding of new seeds, only time will prove whether a new variety will remain true to type or not; many excellent samples of seed revert to an inferior ancestral stock in the course of several generations, hence the very great importance of knowing whether the new variety is really a stable form.

In casting round to ascertain whether there might not possibly be some commercial advantages in electric lighting for market gardeners, other than for a special seasonal trade, the discovery was made by the writer that if the plants in greenhouses are given, in turn, one night's treatment, they make remarkable progress. In point of fact this progress is very much greater than the average per day if the plant were illuminated for a number of days. As one night's treatment improves the plants so much, it is well worth the while of an enterprising market gardener to treat all his plants in turn in this way. The practical method for carrying this out would be to suspend the lamps from an overhead runway of galvanised wire, so that each lamp can easily be moved into a fresh position for each night's treatment, as this would involve less labour than moving the plants to positions under fixed lamps.

The next commercial application discovered was in connection with the pricking out or transplanting of seedlings. Every gardener, amateur or otherwise, is fully aware how, on the day after the transplanting of seedlings, most of them fall over and wilt. Now it is well known that any check in the growth of either a plant or an animal when young has its effect ever after. The discovery was made, however, that when such seedlings were exposed to intensive illumination for one night, not only did they not wilt, but with one night's treatment they appeared to have put on a week's growth and to be exceptionally strong and healthy.

The illustrations, figs. 1 and 2, give an idea as to the type of reflector employed and its location in relation to the plants. It must be admitted by everyone that the two illustrations show a very striking difference as the result of four days' lighting.

In recommending this mode of lighting to market gardeners, the obvious course is to advise its application in conjunction with automatic time switches and the use of the light between midnight and six a.m.—at which time, undoubtedly, most of the electricity supply undertakings would be prepared to grant special rates. It is a matter of great interest to all associated with the electrical engineering and market gardening industries to find that there are excellent possibilities of commercially applying what has hitherto only been a scientific feat. True, the scientific work, so far, is still in its early stages and cannot by any means as yet be described as an exact science. To begin with, different varieties of plants seem to grow better under different intensities of illumination, thus there is scope for considerable economy in the application of the light. For the time being 1,000-watt gasfilled lamps, placed three feet above the plants, will give satisfactory results, but in many cases undoubtedly more light is being supplied than is necessary, yet, on the other hand, it is only just sufficient for many plants. Environment must always play its part, and the gardener must always be a man who is skilled in the culture of plants. For one thing, if care is not taken, some plants will become

too "leggy," *i.e.*, lengthen out too much, or else show effects of forcing.

In 1918 Dr. Steinmetz, in conjunction with Mr. J. L. R. Hayden, grew beans under five 500-watt, gas-filled lamps, placed three feet above the ground, and giving an intensity of illumination over the plants of 700 lumens per square foot of ground. The power consumption over the bed in the 44 days, during which these lamps were kept burning day and night, was 55 watts per square foot. They found that the rate of growth and development was nearly double that of a control plot which received only daylight.

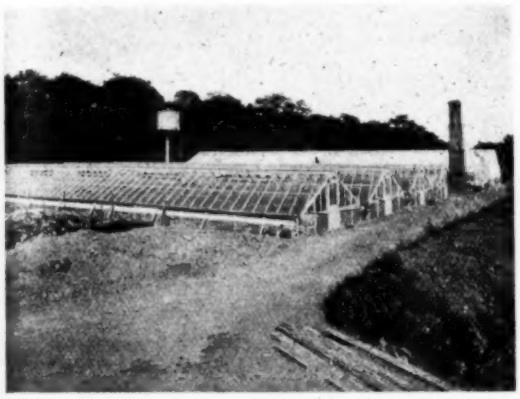


Fig. 3.—Electrically-lighted Glass-houses.

Plants may be roughly classified from a light point of view as (*a*) those which respond to long days and therefore bloom in the summer time, and (*b*) plants which require only a short day (less than 12 hours) and therefore bloom early in the spring or late in the autumn. There is still another class (*c*) to which the length of day seems immaterial, and which therefore bloom all the year round.

It has always been assumed that ultra-violet rays were a most important factor in plant growth, hence many experimenters have employed mercury-vapour arc lamps. However, it is of interest to realise that the half-watt lamp, when used intensively, can produce better results, because, after all, a half-watt lamp is an article which can easily be obtained commercially on the market and is actually in stock in every town of any size. On the other hand, mercury-vapour lamps are very much more difficult to obtain and require greater care in handling. Further, it is doubtful whether many electrical contractors would even know where to place an order for one. Still the ultra-violet ray lamp may yet be found to have a field of its own.

There is quite an extensive bibliography on the treatment of plants by artificial light. Arrangements have been made to insert a list, in due course, in the new journal *Electro-Farming*. Hence much valuable information on the artificial illumination of plants is already available for those who desire to follow up the practical applications.

Another commercial use of electric light by the market gardener is for the prosaic task of cutting and picking blooms at the last minutes before dispatch, which often means after sunset. Fig. 3 shows a range of glass-houses which are so lighted. Incidentally, they are wired with Kaleeko, the junction boxes being made moisture-proof with the aid of Kalaloid composition. Damp, of course, is the bugbear of greenhouse wiring.

Electric heating does not at present seem to come within the range of practical politics for greenhouse work. It has, however, been used successfully under conditions where power can be obtained very cheaply. The writer recently had an opportunity of inspecting some greenhouses heated in this way. One of the very great difficulties that has to be contended with is the moistness of the atmosphere and considerable trouble is experienced with switches; in fact, it is wise to employ a totally-enclosed iron-clad switch for this purpose. One successful method of arranging the heating is to employ bare wires run around the greenhouses, so as to get an effective distribution. These heating wires are protected by galvanised sheds or inverted guttering, from the drops of water falling from the plants overhead.

When electric light is installed on a market garden other applications of electricity will naturally follow. The four most important uses will be (*a*) for the pumping of water to tanks for use in watering cans; (*b*) for automatic watering devices; (*c*) for distributing liquid manure; and (*d*) for spraying insecticides in powder and liquid forms. Then the electric vehicle for the transport of the crops to the railway station or wholesale market must not be overlooked. Many market gardeners have developed so far to-day that they already employ six-ton vehicles.

Another Wireless Exhibition.

A Review of the Novelties at the Horticultural Hall.

(*Concluded from page* 646.)

Amongst the loud-speakers displayed, the Western Electric "Kone" was demonstrated in the main hall with the aid of the "public address" system. It is a fine instrument, though the best results are obtained only when real power valves are used. A novel, if somewhat expensive, instrument is the "Statophone," which was shown by Messrs. C. F. Elwell, Ltd.

A New Loud-speaker.

Its action is described as electrostatic, the conventional magnetic system with its diaphragm or reed having given place to a very light metallised membrane; in fact, the speaker consists essentially of a condenser, one plate of which is a heavy casting, whilst the other is flexible and constitutes the diaphragm of the instrument. A varying potential applied across the plates sets up corresponding mechanical forces, causing the flexible plate to move. In practice, the diaphragm consists of a single lamina of mica of the order of 1 mil thickness and approximately 12 in. diameter, silvered on one side to render it conducting and clamped round its circumference between two heavy metal rings. The fixed plate is insulated from the clamping rings by ebonite insets, and is machined so as to approach the diaphragm to within a few mils. The associated receiving equipment consists of a detector followed by a resistance-capacity coupled amplifier terminating in a filter circuit which applies the signal potentials to the loud speaker. A constant potential is also applied directly across the loud-speaker plates by means of a high resistance connected between the constant potential side of the filter and the valve filaments. Tonal purity rather than noisy volume has been sought, and the "Statophone" speaker with its special receiver are mounted together in a cabinet measuring 20¼ by 15¾ by 8¾ in. One model employs a crystal detector and a 3-stage resistance amplifier, and the other is a 4-valve set with reaction in the aerial circuit.

Thermionic Valves.

The number of different types of thermionic valve suitable for reception purposes now obtainable in the British market is at least 90; the selection of the best for any one particular function is accordingly of considerable importance, and it might almost be said difficulty too. Much depends on the interpretation of the varied characteristics of the several types, the choice being limited by conclusions reached regarding cost,

battery power needed, and, as a rule, what may be considered undesirable mechanical or constructional features.

Amongst those seen at the show, the Fellows Magneto Co.'s "Louden" valves are remarkable for their low price; the bright emitters take 0.4 A at 4.5 V, and the dull emitters need only 0.1 A at from 4 to 6 V according to type, the anode voltage being from 40 to 80 in both cases. The valves exhibited by Cleartron Radio, Ltd., are of American design, but are now being made in a Birmingham factory. The "multi" valves shown by the Nelson Electric Co., Ltd., are interesting in that each has three filaments which can be brought into use one or two at a time as desired by a simple switch device incorporated in the cap, as indicated in fig. 5. The switch consists of two arms pivoted scissors-like on one of the valve legs. When one filament is desired, the arms should be brought together with the tips in contact with one of the three studs in the cap base. When it is to be used as a power valve and two filaments are required, the arms should be opened in the opposite direction, so that the tips come in contact with any two of the studs, thus paralleling two filaments. Two new types were recently introduced; one operates at 1.8 V and 0.35 A, and the other at 3 V and 0.06 A.

Fig. 5.—A 3-filament Valve.

The Stethophone.

Of the various sounds produced within the heart or lungs, the actual intensity is not in itself of fundamental significance; for example, certain serious organic lesions may make themselves evident only by faint murmurs. Hence it is of pathological importance that means should be available of hearing the slightest sounds above the more general noises, and the "Stethophone," which was demonstrated by the Western Electric Co., Ltd., is a precision apparatus designed to amplify just those faint murmurs which are of such vital importance. It consists of the following elements:—An electromagnetic transmitter, a three-stage amplifier with potentiometer control, a selected group of electrical filters, and a multiplicity of receivers for observers, of which, perhaps, the filters are the most interesting. Normally there are five; a high-pass 130-cycle filter, a low-pass 130-cycle, a low-pass 400-cycle, a low-pass 650-cycle, and a low-pass 1,100-cycle filter. The first two eliminate interfering noises, including sounds of the human voice. The 400-cycle filter is useful for observing presystolic and low-pitched systolic and diastolic murmurs. The 650-cycle is valuable for high-pitched murmurs and low-pitched rales, whilst the 1,100-cycle passes only the very high-pitched murmurs and rales. The valve amplifier is distortionless between the limits of observation, and of course the degree of magnification can be increased to any desired extent. The apparatus, which is shown in use in fig. 6, requires 6-volt and 130-volt batteries for its operation, and when mounted for use in hospitals resembles a tea-wagon in appearance. There are many applications for this remarkable instrument; for example, by the addition of a recording galvanometer, photographic reproductions of heart and chest sounds can be made and retained as permanent records.

Fig. 6.—The "Stethophone."

The Audiometer.

Another exhibit of the Western Electric Co., Ltd., was a portable instrument suitable for use in delicate functional and diagnostic examinations by otologists; it may also be used to apply standard hearing tests for physical examination purposes, and measurements sufficient to form a picture accurately indicating the character and deficiencies of acuity can rapidly be taken. Such readings, when plotted with the zero line representing normal hearing, is called an "Audiograph."

The audiometer, fig. 7, is acoustically a generator of pure tones which may be varied both in pitch and intensity at the will of the operator. The oscillator has a frequency range which extends from 64 to 8,192 double vibrations or cycles per second. This range is divided into eight steps of frequency, 64, 128, 256, 512, 1,024, 2,048, 4,096, 8,192 cycles per second, and the desired steps are selected by the operator with keys that control the oscillator coils and condensers, and the circuits are arranged so that if two keys are thrown at one time, no oscillation is produced, thus preventing incorrect results. A "Wecovalve" is used in the oscillating circuit, while a volt-milliameter is provided to measure the filament current and the plate voltage, so that the power supply to the valve may be maintained at the proper value. The source of power for both the filament and plate of the valve is dry batteries. The attenuation potentiometer, which forms part of the audiometer, consists of a resistance network connected to a 24-point intensity control which serves to vary the output of the oscillator. The movement of the switch from one point to the next causes a change of five sensation units in the output; the sensation unit being approximately the smallest change in intensity perceptible to a person of normal hearing.

Fig. 7.—The Audiometer.

The Metering of Three-Phase Power.

The Effect of Abnormal Conditions on Single-phase and Polyphase Meters.

By GEORGE D. MALCOLM.

WHEN considering the question of metering a three-phase power supply, it is always safe to assume that at some time or other conditions will arise which will destroy equality between the phases, even when an initial test proves the load to be perfectly balanced. One phase may become open-circuited due to a fuse blowing or to a faulty winding, and the motor may still continue to function on light loads, either with or without the knowledge of the consumer. I have known of three-phase motors running for quite long periods with one line fuse "blown," starting being effected by manual "assistance" at the belt. The fault would probably be rectified before the date of the next meter reading, but it is the consumption during the faulty period that has to be dealt with, and unless suitable means of integrating are provided, it is extremely difficult to compute this correctly. It is imperative, therefore, if accurate registration is desired, that equipment be installed capable of coping with abnormal conditions.

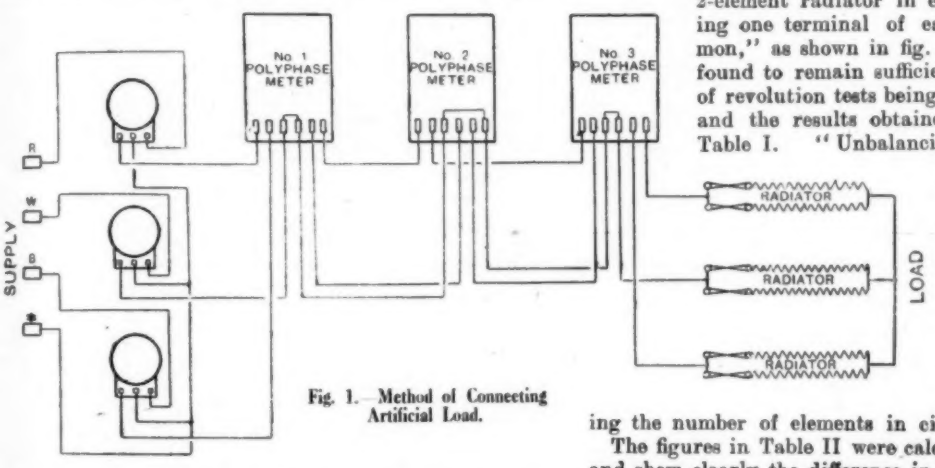


Fig. 1.—Method of Connecting Artificial Load.

With a view to acquiring data on this subject, experiments were made to ascertain what discrepancies could be expected under the following four systems of metering on a three-phase, 4-wire network:—

System No. 1.—One single-phase 240-V meter. Registration multiplied by 3.

System No. 2.—Two single-phase 240-V meters. Registrations added and result multiplied by 1.5.

System No. 3.—Three single-phase 240-V meters. Registrations added.

System No. 4.—One three-phase 3-wire 415-V meter. Direct reading.

The first series of tests was carried out for the purpose of demonstrating the relative performances of single-phase and polyphase meters on a star-connected, non-inductive, three-phase load under various conditions. An easily controlled and practically non-inductive artificial load was obtained by connecting one 2-element radiator in each phase and making one terminal of each radiator "common," as shown in fig. 1. The current was found to remain sufficiently steady to allow of revolution tests being taken on all meters, and the results obtained are tabulated in Table I. "Unbalancing" was effected by manipulation of the radiator switches, there being one switch per element. The precise condition under which each test was made can be gauged from column 2 (Table I), the figures indicating the number of elements in circuit on each phase.

The figures in Table II were calculated from Table I, and show clearly the difference in the number of units chargeable under the four systems. It will be readily seen that systems Nos. 1 and 2 are far from satisfactory under the extraordinary circumstances which sometimes arise. The red phase meter represented the service meter in system No. 1, and the red and blue phase meters provided the figures for system No. 2.

In the second series of tests the three radiators were substituted by a 2-h.p. three-phase motor, and, as this was running light, a highly inductive load was the result, especially when the unbalanced conditions were created. The load, however, was too unsteady to allow for revolution tests to be made, so dial tests were taken over a period of days, and the results obtained are set out in Table No. 3.

It will be noticed that under certain conditions one single-phase meter reverses, whilst another is speeded up, the total power being the algebraical sum of the three. Assuming that the meters register correctly in either direction, this does not matter much in the laboratory, but from a practical meter-reading point of view it is very unsatisfactory, as it is sometimes difficult to ascertain whether the difference in the readings is due to external influence, or to a defective meter. In any case, careful investigation *in situ* is called for, with the attendant loss of time and delay in the issue

TABLE I.

RELATIVE PERFORMANCES OF SINGLE AND POLYPHASE METERS ON A STAR-CONNECTED NON-INDUCTIVE LOAD.

Condition of load.	Radiator elements in circuit.			Load in watts.				Calculated meter watts.					
								Single phase.				Polyphase.	
	B	W	R	Blue.	White.	Red.	Total.	Blue.	White.	Red.	Total.	No. 1.	No. 2.
Balanced—full load	2	2	2	1,700	1,700	1,700	5,100	1,730	1,710	1,725	5,165	5,150	5,120
,, half load	1	1	1	860	860	850	2,570	866	866	864	2,596	2,580	2,640
Unbalanced—Red phase light	2	2	1	1,440	1,440	1,220	4,100	1,615	1,615	1,080	4,310	4,250	4,280
,, White ,, ,, ...	2	1	2	1,420	1,220	1,430	4,070	1,618	1,058	1,622	4,298	4,280	4,300
,, Blue ,, ,, ...	1	2	2	1,200	1,440	1,400	4,040	1,058	1,585	1,585	4,228	4,230	4,270
,, Red ,, heavy ...	1	1	2	1,100	1,100	940	3,140	994	978	1,300	3,262	3,320	3,270
,, White ,, ,, ...	1	2	1	1,100	960	1,110	3,170	968	1,300	982	3,250	3,210	3,210
,, Blue ,, ,, ...	2	1	1	940	1,140	1,120	3,200	1,300	955	968	3,223	3,250	3,200
Blue phase fuse drawn	—	2	2	—	1,260	1,250	2,510	—	1,285	1,300	2,585	2,520	2,570
White ,, ,, ,, ...	2	—	2	1,240	—	1,300	2,540	1,320	—	1,320	2,640	2,620	2,500
Red ,, ,, ,, ...	2	2	—	1,260	1,300	—	2,560	1,340	1,342	—	2,682	2,600	2,600
Blue phase winding open-circuited ...	—	2	2	—	1,260	1,260	2,520	—	1,340	1,365	2,705	2,475	2,540
White ,, ,, ,, ,, ...	2	—	2	1,240	—	1,280	2,520	1,340	—	1,342	2,682	2,580	2,560
Red ,, ,, ,, ,, ...	2	2	—	1,260	1,300	—	2,560	1,335	1,345	—	2,680	2,600	2,618

of accounts. If the duration and cause of the trouble cannot be found, the resultant estimated consumption is a matter for compromise between the undertaker and the consumer.

Table II.

Units chargeable to consumer in respect of three-phase supply to a non-inductive load under four systems of metering. Calculated from data in Table I and reduced to a percentage basis to facilitate comparison.

Condition of load.	True units.	System No.			
		1	2	3	4
Balanced—Full load	100	101	101	101	101
„ Half load	„	101	101	101	102
Unbalanced—Red phase light ...	„	79	99	105	104
„ White „ „ ...	„	120	120	106	105
„ Blue „ „ ...	„	118	98	105	105
„ Red „ heavy ...	„	128	113	107	108
„ White „ „ ...	„	93	93	103	102
„ Blue „ „ ...	„	91	106	101	101
Blue phase fuse drawn	„	156	78	103	102
White „ „	„	156	156	104	101
Red „ „	„	0	78	105	102
Blue phase winding open circuited	„	162	81	107	99
White „ „ „	„	159	159	106	102
Red „ „ „	„	0	78	104	102

Table III.—Relative Performances of Single and Polyphase Meters on Inductive Power Load, 2-h.p. Motor Running Light.

Condition of load.	Units registered.							
	Single-phase meters.				Polyphase meters.			
	Blue.	White.	Red.	Total.	No. 1.	No. 2.	No. 3.	Average.
Unbalanced.—Blue phase light	8·4	− 9·4	16·6	15·6	15·8	16·6	13·7	15·4
„ White phase light	9·9	5·8	− 6·3	9·4	9·7	10·4	9·8	9·9
„ Red phase light	− 7·1	10·3	6	9·2	8·9	10·8	9·2	9·6
Blue phase fuse drawn	0	− 5·1	10	4·9	5·2	5·3	4·3	4·9
White phase fuse drawn	7·9	0	− 3·7	4·2	4·5	4·4	4·3	4·4
Red phase fuse drawn...	− 5·4	10·8	0	5·4	4·6	5·9	5·5	5·3

Table IV.

Units chargeable to consumer in respect of a three-phase power supply (inductive) under four systems of metering as in Table II.

Calculated from data in Table III and reduced to a percentage basis, assuming average of polyphase meters to be correct.

Condition of load.	System No.			
	1	2	3	4
Unbalanced.—Blue phase light ...	324	244	101	00
„ White „ ...	−191	55	95	100
„ Red „ ..	188	−17	96	100
Blue phase fuse drawn	610	310	100	100
White „ „	−250	143	95	00
Red „ „	0	− 53	102	100

Table IV is similar to Table II, but owing to the inductive nature of the load and the complications caused thereby, the differences are greater than in the case of the non-inductive load.

Many of the conditions produced were extreme, but they do, however, represent what occasionally occurs in practice, and one must be prepared to meet them.

It would appear, from the results obtained, that the only satisfactory means of doing so, as far as three-phase industrial power metering is concerned, is by the use of suitable three-phase, unbalanced load meters.

The question of capital outlay is often an important factor when deciding on the method of metering to be employed, and a comparison of the relative costs of instruments for the four systems under consideration may be interesting. Taking present-day "ring" prices for meters of 10-ampere capacity, and assuming the price of one single-phase meter to be unity, the comparative costs are as follows:—

System	No. 1 ...	1
„	No. 2 ...	2
„	No. 3 ...	3
„	No. 4 ...	2.47

Having regard to the inaccuracies which may occur under systems 1 and 2, I think we may safely rule them out, and this leaves the choice between systems Nos. 3 and 4. Here the advantage lies with the latter, both as regards price and performance, as has been shown. The fact that there is only one reading dial on the polyphase meter is also a point much appreciated by consumers, and incidentally by the departments dealing with meter readings and accounts.

I have not included the use of two separate single-phase meters operating on the 2-wattmeter method, for here again arise the complications due to the reversal of one meter during periods of low power factor, and the uncertainty as to whether the difference between the readings of the two meters is due to this cause or to a defect in one of the meters. From the cost point of view there is little to be gained, as, owing to the shunt coils having to be wound for phase voltage instead of for the voltage between phase and neutral, the price per meter is higher. Using the same constant as before, the cost factor for two 10-ampere single-phase meters would be 2.46. When one considers the time spent in investigating the cause of unequal readings, in additional meter reading, additional records, and the like, the slightly higher cost of the polyphase meter is amply justified.

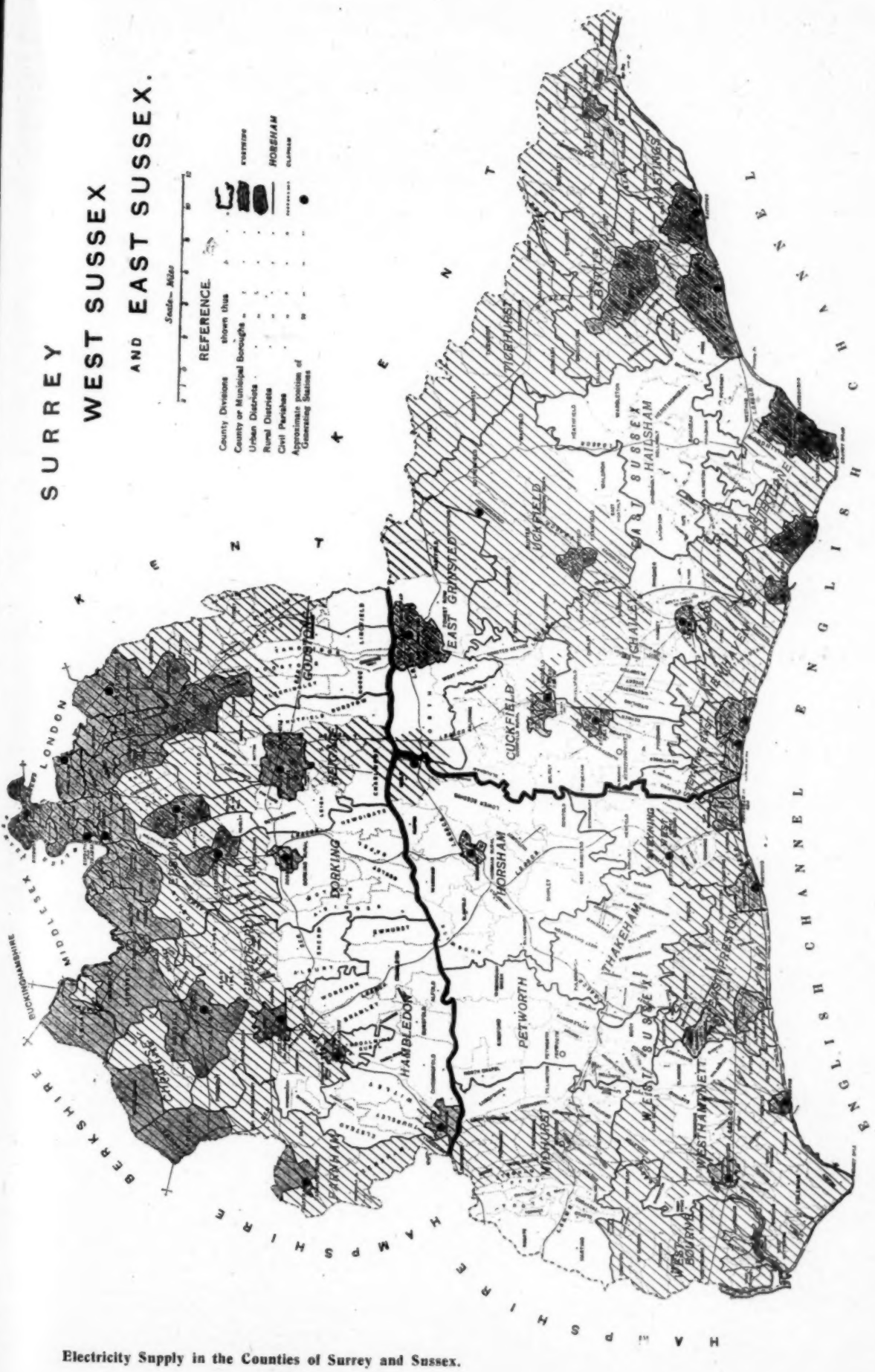
The writer desires to express his thanks to Mr. W. C. P. Tapper for his courtesy in permitting the publication of the test figures.

Electricity Supply in Great Britain.—IV.

Surrey and Sussex.

In the notes which accompanied the map of Kent and the map of Herts, it was pointed out that most of the *unshaded* area in those two counties was covered by the Acts of certain undertakers, but it should be noted that such is not the case in the map of Surrey and Sussex, which we reproduce this week. So far as we have been able to ascertain, no statutory powers for the supply of electricity are held, nor have any yet been applied for, in respect of the areas which are not hatched on the map on the opposite page.

In the list of undertakers concerned in the supply of electricity in Surrey and Sussex, given on p. 692, it is interesting to note that, including the Metropolitan Electric Supply Co., Ltd. (which has bulk supply powers in the Urban Districts of Egham and Chertsey and the Parish of Thorpe), there are 20 undertakers, marked by an asterisk, whose areas of supply are wholly or partly included in the London and Home Counties Electricity District.



Electricity Supply in the Counties of Surrey and Sussex.

Local Authorities.

*Barnes Urban District Council.
Bexhill Corporation.
Brighton Corporation.
Chichester Corporation.
*Croydon Corporation.
Eastbourne Corporation.
East Grinstead Urban District Council.
*Epsom Urban District Council.
*Guildford Corporation.
Hastings Corporation.
Horsham Urban District Council.
Hove Corporation.
*Kingston-upon-Thames Corporation.
Portsmouth Corporation.
*Reigate Corporation.
*Wimbledon Corporation.
Worthing Corporation.

Companies.

Aldershot Gas, Water & District Lighting Co.
*Ascot District Gas & Electricity Co.
Bognor Gas Light & Coke Co.
Burgess Hill & District Electric Supply Co., Ltd.
*Callender's Cable & Construction Co., Ltd.
*County of London Electric Supply Co., Ltd.
Crowborough District Gas & Electricity Co.
*Edmundson's Electricity Corporation, Ltd.
*Egham & Staines Electricity Co., Ltd.
Farnham Gas and Electricity Co.
Hayward's Heath & District Electric Supply Co., Ltd.
Hindhead & District Electric Light Co., Ltd.
*Leatherhead & District Electricity Co., Ltd.
Lewes & District Electric Supply Co., Ltd.
*Richmond (Surrey) Electric Light & Power Co., Ltd.
*Sevenoaks & District Electricity Co., Ltd.
Shoreham & District Electric Light & Power Co., Ltd.
*South Met. Electric Tramways & Lighting Co., Ltd.
Steyning Electric Light Co., Ltd.
Sussex Electricity Supply Co., Ltd.
*Twickenham & Teddington Electric Supply Co., Ltd.
Uckfield Gas & Electricity Co.
*Urban Electric Supply Co., Ltd.
Weald Electric Supply Co., Ltd.
*Woking Electric Supply Co., Ltd.
York Town & Blackwater Gas Co.

The following figures for the Administrative Counties of East Sussex, West Sussex, and Surrey, with the associated County Boroughs, have been obtained from the 1921 Census :—

Acres.	Persons.	Resident families.	Buildings not containing dwellings.
1,394,304	1,658,083	376,337	19,953

The map itself has been prepared by using the 1917 Boundary Commission maps (by permission of the Controller of H.M. Stationery Office). Since 1917 the following alterations have been made :—

(1) Part of the Parish of Trotton has been transferred to the Parish of Iping.

(2) The Borough and Parish of Guildford has been enlarged by the inclusion of part of the Parish of Artington.

(3) The County Borough of Brighton has been extended so as to include part of the Parish of Patcham, the added part being transferred to the Parish of Preston in Brighton County Borough.

(4) Part of the Parish of Farnham Rural has been transferred to the Urban District and Parish of Farnham.

(5) The boundary line between Croydon County Borough and Mitcham Urban District has been slightly amended.

(6) The Parish of Hollington Saint John has been merged into the Parish of Hastings, which is now coextensive with the County Borough of Hastings.

The Institution of Electrical Engineers.

Inaugural Address by R. A. CHATTOCK, President I.E.E. ***(Abstract).***

It is an illuminating fact that two chief engineers of large electricity supply undertakings have been selected during the past session and the present session to this high office, and I cannot help thinking that the intention underlying this was largely influenced by the fact that at the present time His Majesty's Government is interesting itself in the present position and the future of this particular section of the industry, and in consequence the subject is becoming one of great public interest.

The report of the Electricity Commission, embodying as it does such a vast amount of statistical matter in connection with the generation and supply of electrical energy in this country, is, in my opinion, a most valuable book of reference for supply engineers.

The general review embodied in the report is particularly valuable, including as it does average figures for the whole country. It is gratifying to know that the cost of production is coming down, and the cost to the consumer is being lessened. It is, I think, obvious that the improvement year by year has been materially assisted by the general policy of the Commissioners. The task that they are carrying out can only be regarded as colossal. One hears complaints that things are not moving fast enough, and that after six years only one Joint Authority has so far come into existence. In my opinion, far better and more lasting progress can be made by going slowly and thoroughly considering each step. I should like to suggest to the Commissioners in a spirit of friendly criticism that, when far-reaching and costly changes are contemplated, a free and frank discussion with the interests involved would be of far greater value to the commercial community than the production of a cut-and-dried proposal that has to stand antagonistic criticism, which might quite easily have been disarmed by reasonable compromise.

It seems to me that to compare the performance of steam-operated stations on a "pounds of coal per unit generated" basis only is rather misleading. What we are all aiming at is to produce and distribute electricity as cheaply as possible.

A station using fuel of a very poor calorific value at a low price per ton can produce electricity quite as cheaply as a station using high-priced fuel of high calorific value, although the fuel consumption per unit and the thermal efficiency of such a station may compare unfavourably with those of the station using the expensive fuel.

Again, if the distillation of coal proves to be a commercial possibility, from 30 to 70 per cent. more weight of coal will have to be handled to produce a given quantity of electricity, and whilst it may pay handsomely to adopt this process, the number of pounds of coal used per unit will of course compare very unfavourably with the figures obtained in a station burning coal to destruction.

I think, therefore, that a better method of comparison would be the cost, rather than the weight, of the fuel per unit generated, and this cost would have to take into account the sale of any by-products obtained in any process of distillation.

The selling price of these products depends on world-wide competition with products obtained from sources other than coal. It also depends on the demand for these products in the available markets. The gas industry at the present time is suffering very severely from its inability to dispose of the by-products at a remunerative figure. It is therefore very desirable to realise that if processes of this kind are adopted, a serious commercial risk will be run which may have an adverse effect on the selling price of electricity.

Boiler-house efficiencies of 90 per cent. can now be obtained, compared with 80 per cent. a few years ago. The difficulty of obtaining, for lining the furnaces, a refractory material that will stand up to the high temperatures without undue maintenance cost, has been solved by screening the furnace walls with water tubes which are coupled up to and form part of the boiler itself. The circulating system through these tubes is kept distinct from the main circulation through the boiler, and very high rates of evaporation—in some cases as much as 50 lb. per square foot of heating surface—are obtained from these tubes, apparently without any consequent disadvantages.

There are five great advantages in the use of pulverised fuel, as compared with boiler-house practice up to the present. These are :—

(1) Greater efficiency in operation.

(2) Greater capacity of individual boiler units—it being possible to install boilers each having a capacity of 300,000 lb. of steam per hour, with single combustion chambers.

(3) Greater reliability of the pulverised-fuel furnace, whilst the regulation of the temperature can be controlled with wonderful accuracy and consistency.

(4) The reduction in the cost of labour in operating such boilers is nothing less than extraordinary. One attendant can control the operation of a battery of boilers having a combined capacity of 1 million lb. of steam per hour.

(5) The efficient use of all classes of fuel. It is possible to use efficiently the poorest classes of fuel, which have hitherto been looked upon as refuse and cannot be burnt on mechanical stokers. Such a development will be of national importance, as it will make available for service the refuse heaps of old colliery workings which have been accumulating for many years.

It is evident that considerable economy, both in capital cost and in operation, can be looked for in the future.

We are now told that pulverisation has to be combined with low-temperature carbonisation in order to obtain a still further reduction in the cost of production. The proposal sounds more attractive than the ordinary low-temperature carbonisation process, as the resultant fuel is obtained in a pulverised form and can be sent direct to the boiler furnaces. The process, however, has yet to be demonstrated and proved before it can be accepted for general use.

In this country the load factor obtained in the majority of the undertakings is between 15 and 30 per cent. Those undertakings which have a higher load factor have the benefit of long-hour demand, such as is created by railway traction, colliery pumping, and similar loads. Experience in America also goes to show that a load factor of 45 to 50 per cent. can be obtained where these long-hour loads are available.

The statistics issued by the Electricity Commission show that only six undertakings in this country obtain a load factor exceeding 45 per cent. The combined load factor for the whole of Great Britain was of the order of 28 per cent. in 1922-23.

The reduction in load factor that has occurred during recent years has been due to three causes:—

(1) The bad condition of most manufacturing industries.

(2) The reduction in working hours.

(3) The phenomenal increase in the lighting connections in residential districts.

The reduction in working hours in factories has had the greatest effect in reducing the load factor, and if this is felt so severely on the capital charges of the supply undertakings, how much more must it be felt on the capital outlay of factories. One can only hope that, when trade does revive, it will be possible to run two or three shifts of men in the factories and so improve the serious position in which we are all placed at present.

The load factor of a residential lighting supply is approximately 10 per cent. It is obvious, therefore, that if this supply is increased to a relatively much greater extent than the power supply, it will have the effect of reducing the average load factor and increasing the cost of production. It is therefore incumbent upon supply engineers to do their utmost to foster the use of electricity for cooking and heating. The most telling way is to arrange an attractive tariff, and the one that seems to find most favour with the average householder is that under which the consumer pays per quarter a fixed sum, and a low charge per unit for every unit used in the house—whether for lighting, cooking or heating.

The suggestion that has been made in certain quarters, that the general load factor throughout the country can be improved by linking-up all the big centres of supply and by taking advantage of the better diversity factor so created, is in my opinion outside the realms of possibility. This proposal has been tried to a certain extent in America, and experience has shown that the peak load rises as fast as the output. The expansion of these large systems by means of heavy trunk lines running long distances has not had the effect of improving the load factor on the system; on the contrary, it is tending to decrease this as the area of supply grows larger.

In this country there is no evidence that the habits of the population vary as between one large industrial centre and another. The hours of work in the factories are approximately the same, and there is no reason for believing that the peak load in one district would occur at a substantially different time from that in another.

It does not therefore appear, from the point of view of improving the load factor, that there is any justification for incurring the enormous expenditure that would be necessary to link up all the big centres in the country with trunk mains of sufficient capacity to enable their effect to be felt in the operation of the generating stations.

(To be concluded.)

Business Notes.

Commercial and Industrial Developments, Business Changes, Trade Opportunities, New Publicity Literature, Liquidations and Failures.

The Western Electric's New Name.—The Western Electric Co., Ltd., of London, will from October 31st, 1925, be known as "Standard Telephones and Cables, Limited." The registered and executive office will remain at Connaught House, Aldwych, W.C.2. We have already published some particulars respecting the sale to the International Telephone and Telegraph Corporation of the International Western Electric Company, by the Western Electric Company Incorporated. Under this new ownership, the International Western Electric Company will in future be known as the International Standard Electric Corporation, and will continue to hold exclusive licences under the foreign patents of the Western Electric Company Incorporated in the telephone and telegraph field, and will also continue to act as the exclusive distributors outside of the United States, Canada, and Newfoundland, for all Western Electric manufactures. The change in ownership of the International Western Electric Company, with which the Western Electric Co., Ltd., of London, has been affiliated, will not involve any material changes in the organisation or in the broad policy that has always been followed by the latter company, unless such changes are of a progressive nature.

E.D.A. Activities.—The most recent publication of the British Electrical Development Association is an illustrated folder (E.D.A. No. 582) entitled "People Buy where the Light is Bright." This, as its title indicates, deals with shop lighting, and it contains a list of retail trade journals covering many industries in which a series of E.D.A. advertisements (reproduced in the pamphlet) will appear during the next few weeks.

Among the various conferences, &c., for which the British Electrical Development Association and its staff will be responsible during the coming month is an event at Leighton Buzzard on November 24th. A town's meeting is being organised by the Leighton Buzzard Traders' Association, at which Mr. V. W. Dale will deal with "The Use of Electricity in the Home."

Patents in Turkey and Latvia.—The *Board of Trade Journal* reports that Turkey and Latvia have acceded to the Industrial Property Convention, and the provisions of Section 91 of the Patents and Designs Act, 1907, as amended by the Acts of 1914 and 1919 are accordingly in force as from August 20th last in the case of Latvia, and as from October 10th last in the case of Turkey.

A Radio Campaign.—In order to popularise "Sterling" and "Marconi" radio products, the MARCONIPHONE CO., LTD., is supplying to dealers a set of effective showcards, &c. "Marconi" valves are represented by a showcard, a lampshade, and a circular mirror. The Sterling "Mellovox" loud speaker is advertised by a stand-up cardboard cut-out of a lady conducting an orchestra, and other "Sterling" radio apparatus provides a subject for another ingenious cut-out.

Slide Rule for Wire Rope.—Messrs. Bruntons, of Musselburgh, have sent us a sample of an ingenious slide rule, which gives the essential particulars of the four types of steel wire rope that are most widely used; for each of these one setting of the slide gives the diameter and circumference, weight per yard, and guaranteed actual breaking strain of five qualities of wire. It is not a slide rule in the ordinary sense, having no logarithmic scales; the slide carries tabulated data, of which the appropriate items appear simultaneously at four windows in the cover—one set for each of the four types. The price is 2s. 6d.

Lamp Publicity.—Philips Lamps, Ltd., has produced a number of showcards and devices advertising its lamps, and is inserting advertisements in the leading newspapers and magazines. The company also offers to specially dress the shop windows of any members of the trade who request it to do so.

The Shannon Scheme.—It is reported that as the result of conferences between the Irish Free State Government and the National Executive of the Irish Labour Party a basis of negotiation has been found which should result in a satisfactory settlement of the dispute which is holding up the Shannon power scheme. The contractors for the scheme, Messrs. Siemens-Schuckert & Co., require 20,000 tons of coal, and have announced their intention of purchasing this in the best market—not necessarily Germany. They state that they have already placed large contracts with Irish firms, including orders for cement and other materials.

Merchandise Marks.—The Federation of British Industries has drawn the attention of the President of the Board of Trade to the increased importance of the matter of marking imported goods with their country of origin, in view of the support which members of the Government have given to the proposal that the British public should be encouraged to purchase British-made goods. It is considered that regulations can be devised which will be effective in providing means for the buyer to distinguish foreign from British goods, at the same time protecting all legitimate interests, such as the *entrepôt* trade.

The King's Roll.—Sir A. Steel-Maitland, the Minister of Labour, stated last week that it was the intention of the Government to pass a resolution through Parliament definitely instructing Government departments to place contracts only with firms whose names were on the King's Roll (for the employment of disabled ex-service men), in all but exceptional cases. Hitherto this principle has been informally adopted, but the Government's action will place the matter on a more definite basis.

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Dublin Radio Exhibition.—An exhibition of radio apparatus, in which a number of the leading British firms are participating, is to be held in the Mansion House, Dublin, from November 11th to 14th.

Contractors Visit Cosmos Works.—On October 14th, a party of electrical contractors from the London area visited the Cosmos Lamp Works, Brimsdown, Middlesex, in connection with the "Cosmos" Lamp Campaign. After luncheon at Odone's Restaurant, Victoria, S.W.1, the party proceeded by char-a-banc to the lamp works of the Metropolitan-Vickers Electrical Co., Ltd., at Brimsdown, a very interesting tour of inspection of the lamp-making department, the heating and cooking department, and the radio valve department, being made. The return journey was broken in order to permit members of the party to see the company's London showrooms in High Holborn.

Trade Announcements.—New showroom premises at 37, Monson Road, Tunbridge Wells, have been opened by the County Wireless Services, Ltd.

Mr. J. Carman, electrical engineer and wireless expert, of Ramsgate, has opened a branch business at 4, Carlton Parade, Broadstairs.

The Marconiphone Co., Ltd., has opened a branch depôt at 16, Water Street, Liverpool, for the supply of wireless stores to West Lancashire, Cheshire and North Wales.

Mr. D. M. Mason, A.M.I.E.E., late chief assistant engineer at the factories of the Gramophone Company at Hayes, and for a number of years electrical superintendent at Croydon electricity works, has commenced business on his own account at Grafton House, Golden Square, London, W.1, as an electrical engineer and contractor specialising in industrial power plant and factory equipment.

Catalogues and Lists.—The Suffolk Iron Foundry (1920), Ltd., Gipping Works, Stowmarket.—A booklet dealing with oxy-acetylene welding with "super-silicon" rods.

The Siemens & English Electric Lamp Co., Ltd., 38-39, Upper Thames Street, E.C.4.—An illustrated pamphlet containing details and prices of "Siemens-Xcel" domestic electrical appliances, including fires, cookers, vacuum cleaners, &c. Also a showcard in colours effectively advertising "Siemens-Xcel" electric fires.

The Engineering & Lighting Equipment Co., Ltd., Sphere Works, St. Albans, Herts.—Folders Nos. P1227 and 1228, dealing respectively with side-street lighting fittings and standard industrial reflectors.

The Wainwright Manufacturing Co., Ltd., 531, Forest Road, Walthamstow, E.17.—An illustrated and priced catalogue of radio components, including condensers, coil holders, crystal detectors, &c.

Messrs. Wootton & Co., Ltd., High Street, Ponder's End, Middlesex.—A mailing card giving dimensions and prices of wooden backboards and fittings.

Messrs. Falk, Stadelmann & Co., Ltd., 83-93, Farringdon Road, E.C.1.—List No. P1061, containing particulars and prices of "Sunstar" shop-window lighting reflectors and fittings. Also Catalogue No. 559, containing full particulars of "Efescaphone" receiving sets and "Efesca" components. Illustrated and priced.

The Dominion Rubber Co., Ltd., 47-48, Farringdon Street, E.C.4.—A leaflet illustrating a "Matchless" conveyor belt 3,000 ft. in length and 36 in. wide.

The Sloan Electrical Co., Ltd., 8, 10, and 12, Golden Lane, E.C.1.—An illustrated price list of white porcelain insulators and ironwork, and a catalogue of electrical accessories, wires and cables.

The British Thomson-Houston Co., Ltd., Rugby.—Lists A.G. 188, describing "Fabroil A" gears; 4591-A, containing illustrated details of instrument transformers (up to 11,000 V); 5120-B, dealing with field rheostats for generators and motors; and 5,130, describing field discharge resistances.

Drake & Gorham Wholesale, Ltd., 67, Long Acre, W.C.2.—A very comprehensive catalogue (84 pp.) of radio apparatus of all makes, including complete sets, components, and accessories. Each item is illustrated and priced. Also a leaflet (No. 421), dealing with "A.D." Leclanché cells for radio purposes.

Industrial Combustion Engineers, Ltd., Astor House, Aldwych, W.C.2.—Catalogue Nos. 1 to 4, dealing with "Bailey" boiler meters of various patterns. These meters are installed at Manchester (Barton), Birmingham, the L.C.C. Tramways power station, and other important supply undertakings.

The Mullard Wireless Service Co., Ltd., Nightingale Lane, Balham, S.W.12.—A coloured showcard depicting a number of musical fairies and advertising "Mullard" radio valves.

Messrs. W. E. Beardsall & Co., Ltd., 5, Victoria Bridge, Manchester.—A folder illustrating "Winter" interlocking switch plugs. Priced.

The Carpax Co., Ltd., 312, Deansgate, Manchester.—A leaflet describing the "Jasper" screw-on connector for small wires, together with a sample of the device.

Messrs. Clough, Smith & Co., Ltd., 36, Victoria Street, S.W.1.—A well-illustrated brochure, describing the "Straker-Clough" trolley omnibus as supplied to home and foreign tramway authorities.

Brittain's Electric Motor Co., 110, Cannon Street, E.C.4.—A detailed catalogue of the company's a.c. motors of various types and ratings. Illustrated and priced.

Messrs. W. H. Willcox & Co., Ltd., 38, Southwark Street, S.E.1.—Booklets containing particulars of the company's motor lubricants and oils and greases.

General Electric Co., Ltd., Magnet House, Kingsway, W.C.2.—A well-illustrated brochure describing the "Gecoray" system of shop-window lighting; a number of examples are depicted.

Metro-Vick Supplies, Ltd., Trafford Park, Manchester.—Special Publication No. 7130/1, a price list of "M.-V." shop-window lighting equipment, including real silver reflectors.

The Igranic Electric Co., Ltd., 149, Queen Victoria Street, E.C.4.—A series of pamphlets giving details, illustrations, and prices of various "Igranic" radio components and accessories, including coils, transformers, rheostats, condensers, valve-holders, &c.

The Rockwood Co., Ltd., 147, Queen Victoria Street, E.C.4.—A priced folder, illustrating and describing a number of small tools for radio construction—reamers, panel cutters, pliers, wrenches, &c.

Messrs. E. P. Allam & Co., 107-109, Gray's Inn Road, W.C.1.—October stock list of d.c. motors ranging from 1 to 38 h.p.

The Midland Electric Manufacturing Co., Ltd., Barford Street, Birmingham.—A booklet entitled "Switches and Standards," showing new designs of "M.E.M." switches which conform to the requirements of the I.E.E. Rules and Home Office and the Board of Trade regulations, and are made in accordance with the conditions laid down by the British Engineering Standards Association.

Messrs. Ferranti, Ltd., Hollinwood, Lancs.—Pamphlet Ta 710, describing a short-circuit test on a 1,200-kVA, 5,500/440-V standard core-type, three-phase transformer.

Philips Lamps, Ltd., 60, Wilson Street, Finsbury Square, E.C.2.—A pamphlet advertising the "Philips" Christmas tree lighting outfits.

Bankruptcy Proceedings.—H. A. Van Os and M. H. Van Os, trading as Van Os & Company, merchants, 56, Holborn Viaduct, E.C.—These bankrupts applied on October 20th to Mr. Registrar Mellor, at the London Bankruptcy Court for an order of discharge from bankruptcy proceedings instituted last February. Mr. V. Armstrong, Official Receiver, reported that the ranking liabilities amounted to £4,798 and the assets had only realised £2, but a further small sum was anticipated from book debts. The bankrupts took over a business previously carried on by their father. They attributed their failure to depreciation in the value of stock, liability for differences owing to accounts being closed against them, and lack of capital. In November, 1923, they registered a company with a capital of £500 to carry on business as general merchants and manufacturers of electrical lamps and accessories; they became directors of the company; H. A. Van Os was allotted 300 shares and M. H. Van Os 187 shares, but they were subsequently transferred to another person, and the bankrupts held only the qualifying shares. They were in receipt of remuneration at the rate of £125 per annum each, and a commission of 1½ per cent. on the total sales of the company. The discharge was opposed by the Official Receiver on the grounds of (1) insufficiency of assets to equal 10s. in the £ on the amount of the liabilities; and (2) trading with knowledge of insolvency. His Honour granted a discharge subject to judgment for £100, to be satisfied by an immediate cash payment.

A. A. Carr and G. S. Childe, dealers in radio accessories, 38, Park Row, Leeds, and 38, Victoria Road, Scarborough.—The public examination of these debtors was held at the London Bankruptcy Court on October 21st, before Mr. Registrar Hope. The failure occurred last February with liabilities of £555, against assets valued at £51. Replying to Mr. Walter Boyle, Senior Official Receiver, the debtor Carr stated that prior to 1922 he carried on business at Leeds as a stockbroker, but closed down in that year and commenced as an agent for the sale of radio accessories. In 1923 he was joined in partnership by Childe, who paid £750 for a half-share in the business, and subsequently provided a further £250. In November, 1923, they sold their business to Carr & Childe, Ltd., each of them receiving 250 fully-paid £1 shares, and they acted as directors until May, 1924. The failure was attributed to the commission earned having been insufficient to meet overhead expenses, lack of capital, and loss of business in consequence of the non-delivery of goods ordered from manufacturers. The debtor Childe confirmed the evidence given by his partner. The examination was concluded.

W. C. Rhodes, trading as L. J. Palmer & Co., 141, Newspaper House, Corporation Street, Birmingham, electrical engineer and contractor.—The first meeting of creditors was held on October 19th at the Official Receiver's office, Birmingham. The statement of affairs showed a deficiency of £621. Debtor attributed his failure to bad trade and liability in respect of the debts of a partnership. In May, 1923, he entered into partnership with another as electrical engineers, the joint capital amounting to £130, of which one-half represented the value of the stock and trade effects of the partner; the balance was cash contributed by the debtor, while they each provided a further £50. In 1923 the business was removed to Corporation Street, and a year later the partnership was dissolved. A balance sheet then prepared showed a deficiency of nearly £278, and debtor agreed to take over the business, and discharge the liabilities with the exception of a debt of £50 due to his partner's mother. The case being a summary one was left with the Official Receiver as trustee of the estate.

W. K. M. Wilson, 1, Mount Street, Heanor, Derbyshire, electrician and radio apparatus dealer.—The adjourned public examination of this debtor was held recently at the Court House, Derby. It appeared that the debtor commenced business in February, 1922, with £100 borrowed capital. This

business only lasted about a month. He then commenced at his residence, 1, Mount Street, Heanor. Debtor was supplied with faulty goods by manufacturers, and in consequence of this and of competition trade fell off. His liabilities were £373 against assets of £17. Debtor admitted that he kept no books of account. The examination was closed.

S. PURCELL, electrical contractor, The Arcade, Goole.—Receiving order made October 20th on debtor's own petition.

J. KINGSTON (Cromwell Engineering Works), electrical and general engineer, 176, Romsey Road, Shirley, Southampton.—First and final dividend of 3s. 8½d. in the £, payable at the Official Receiver's office, Midland Bank Chambers, High Street, Southampton.

B. UTTLEY, electrician, Tower Street, Bacup.—Receiving order made October 14th, on debtor's own petition.

W. R. SQUIRE, electrical engineer, 11, Steward Street, Spring Hill, Birmingham.—First meeting October 29th, at the Official Receiver's offices, 191, Corporation Street, Birmingham. Public examination, December 2nd, at the Court House, Birmingham.

S. B. WESTON (Westforrest Radio Co.), wireless apparatus manufacturer, Playhouse Arcade, High Street, Guildford.—Trustee, Mr. T. Gourlay, Official Receiver, 29, Russell Square, W.C., released October 7th.

Company Liquidations.—H. W. SMITH & CO., LTD., electrical wire and cable manufacturers, Lydbrook, Gloucestershire.—The statutory first meetings of the creditors and shareholders of this company were held on October 19th at Carey Street, W.C. Mr. J. Barwick Thompson, Official Receiver, reported that the winding-up order was made on April 7th last upon the petition of the Attorney-General, acting on behalf of the Board of Inland Revenue, creditors claiming £47,978. The company was registered in 1912, as a private company, with a nominal capital of 5,000 ordinary shares of £1 each, and was formed to acquire as a going concern the business of electrical wire and cable manufacturers, previously carried on by H. W. Smith and F. W. T. Brain, since 1906. The vendors were the promoters and acted as first directors. Mr. Brain resigned office in March, 1913, and was succeeded in the following August by Mrs. Smith. Under the purchase agreement, the company acquired the goodwill and the assets (with the exception of book debts) for a consideration of £2,530, payable as to £2,000 in shares and £530 in cash, and in addition undertook to discharge the business liabilities, which amounted to £1,137. Mr. H. W. Smith was appointed managing director and secretary at a salary of £250 per annum, plus a bonus on the annual profits; his salary was afterwards increased to £1,000 and later to £2,000 per annum, but no record of any such increase was to be found in the minute book of the company. The issued capital was £3,200, of which £2,000 was allotted to the vendors as fully paid and £1,200 was subscribed by them for cash. During the war the company carried on a very substantial and profitable business. Small losses were made in the first three years, but the subsequent accounts showed profits of £1,494 in 1915, £32,290 in 1916, £33,979 in 1917, and £36,334 in 1918. No proper accounts were kept for 1919, but a draft account showed a loss of £5,063. The company had secured contracts to supply wire and cables to various Governments during the war, and that explained the large profits made in those years; those profits were apparently used to extend the business by providing special plant and machinery and to enlarge the factory. After the war a number of the contracts were cancelled and the business came practically to a standstill. Early in 1920 arrangements were made for a reconstruction of the company and for the provision of finance for the purpose of resuscitating the business during the post-war period. That was to be carried out with the assistance of S. Smith & Sons (Motor Accessories), Ltd. Arrangements were made for the registration of a new company entitled W. H. Smith & Company (1920), Ltd., and for this company to go into voluntary liquidation. Leave was given to register a company with the new title on condition that the old company should go into voluntary liquidation, but apparently no steps had been taken to carry this into effect. The new company was registered on June 10th, 1920, and its original capital of £60,000 was subsequently increased to £75,000. It undertook to acquire the old company's business as from January 1st, 1920, for a consideration of £25,000, payable in 20,000 10 per cent. cumulative preference and 5,000 ordinary shares of £1 each. The book debts of the old company were not taken over but were to be collected by the new company and the proceeds applied to payment of the liabilities of the old company, the new company also undertaking to pay any balances remaining on the old debts. Mr. H. W. Smith was appointed managing director of the new company for five years at a salary running from £1,000 to £1,250 per annum. S. Smith & Sons (Motor Accessories), Ltd., subscribed cash for 25,000 shares and arranged to finance the company by means of a bank overdraft to the extent of £50,000. It was intended that the Smith's Motor Accessories Company should take a considerable quantity of the new company's output, and for a time it did so, but owing to the depression in the motor trade during 1920-21, it experienced trade difficulties itself, and had to reduce its requirements accordingly. The new company appeared to have experienced difficulties from the commencement owing to trade depression and the business was carried on at a loss. In February, 1921, debentures for £50,000 were issued to the bankers to secure the overdraft, and in the following September a Receiver was appointed who took possession of the assets and had since carried on the business. At the date of the transfer to the new company the old company was stated to be liable to the Inland Revenue as follows: Income tax, £6,662; Excess Profits Duty, £39,594; and interest thereon £1,722, a total of £47,978. The company was dissolved on February 9th, 1923, by notice in the *London Gazette*, and was struck off the Register of Joint Stock Companies. In the following December, however, it was restored to the Register on the petition of the Board of Inland Revenue, and that body, through the Attorney-General, presented the petition upon which the order to wind up the company was made last April. The accounts filed under the liquidation showed unsecured creditors for £36,662 and preferential claims of £9,049, whilst the only assets disclosed were £20,000 preference and £5,000 ordinary shares of H. W. Smith & Co. (1920), Ltd., together with a claim against that company for damages for breach of contract in failing to discharge the liabilities of the old company. The Receiver of the 1920 company had informed the Official Receiver that he was about to effect a sale of its assets at a sum which would be insufficient to discharge the debenture issue. It followed that no value whatever could be placed on the shares in the new company or the claim against that body, and there was no prospect whatever of any dividend being paid to either the creditors or shareholders of this company. The failure was attributed by Mr. H. W. Smith to the inability of the 1920 company to discharge the liabilities of the old company owing to general trade depression and heavy depreciation in the value of the stock. Mr. H. T. Marsh, who was appointed secretary on August 23rd, 1920, for the purpose of protecting the interests of S. Smith & Sons (Motor Accessories), Ltd., had expressed the opinion that the company spent much in excess of the large profits earned during the war period, in adding to the buildings, plant and machinery; that expenditure left no funds available with which to secure trade to remuneratively employ the plant and machinery. In the absence of a quorum the meetings were formally adjourned for a week, and the chairman intimated that the liquidation would then doubtless be left in the hands of the Official Receiver.

MORCH BROS., LTD., manufacturers of radio sets and accessories, 35, Tresham Avenue, Clapton, E.5.—The first meetings of the creditors and shareholders were held on October 22nd, at Carey Street, W.C. The winding up order was made last June upon a creditor's petition, and accounts have been submitted showing a total indebtedness of £1,323 and assets valued at £532, leaving a deficiency of £1,790 with regard to contributories, the issued capital being £1,000. Mr. E. T. A. Phillips, Official Receiver, reported that the company was promoted as a private company in December, 1924, with a nominal capital of £1,000, the promoter being Mr. J. J. Morch, who was appointed managing director at a salary of £400 per annum. The promoter and his brother had carried on business as motor engineers, and in the autumn of 1923 they commenced to manufacture wireless sets and accessories, for which purpose they installed the necessary plant. They were handicapped by lack of capital, and borrowed £350 on the understanding that a company should be formed and debentures created to secure the advances. The purchase consideration for the business was agreed at £2,525, payable as to £156 in cash, £1,000 in shares, and the balance by discharging the existing liabilities. The debentures, however, were not issued until March 9th, 1925, which date was within three months of the commencement of the liquidation, and as they were for a past consideration, the bonds were invalid. The chief business of the company was the manufacture of wireless sets and accessories for wholesalers and retailers; a contract was obtained for the supply of about £800 worth of such goods, but after about £300 worth had been supplied, the buyers refused to take delivery of the remainder and that caused a loss to the company. Execution having been levied in May, 1925, in respect of rates, the debenture holders appointed Mr. C. T. Payne as receiver on their behalf and liquidation proceedings followed. The failure was attributed by the company's officials to trade depression, and the illness of the managing director, but, in the opinion of the Official Receiver, the failure was due to the lack of working capital. Upon the making of the winding up order, the Official Receiver, on giving an undertaking to satisfy the execution debt, took possession of the assets and disposed of them by public auction, the sale realising £244 gross. The creditors passed a resolution for Mr. C. Latham, 70, New Oxford Street, W., to act as liquidator, but the shareholders declared in favour of the Official Receiver remaining in office and the chairman announced that the appointment would be made by the Registrar in due course.

CARTER & MITCHELL, LTD., wholesale electrical and wireless suppliers, 24, Allsop Street, Upper Baker Street, N.W.—A meeting of creditors was held on October 22nd, at the offices of Mr. C. Latham, accountant to the Wireless & Radio Trades Guardian Association, 78, New Oxford Street, W. The chair was occupied by Mr. Latham, who said that when the creditors previously met it was reported that the liabilities were £1,236 against net assets of £406, leaving a deficiency of £829. The company was formed in July, 1923, with a nominal capital of £2,000, of which £1,000 had been issued. The creditors decided that Mr. Latham should be appointed as joint liquidator, and the shareholders had since passed a resolution appointing him to act as sole liquidator, as the gentleman originally appointed intimated that he wished to retire. Mr. Latham stated that there was a balance at the bank of only 3s., whilst the fixtures and fittings were estimated to realise £5. There were also book debts valued at £60; doubtful and bad debts, £25; and stock £5. The total assets were £95, from which had to be deducted £74. The Chairman added that there were cer-

tain other assets which were claimed by third persons, but their claims had not been admitted by him. With regard to the liabilities, the amount due to the trade was £816, and in addition there was a contingent liability for alleged breach of contract with a German company. That contingent liability was put down at £7,647. Unless anything unforeseen happened it was unlikely that the creditors would receive any dividend. The voluntary liquidation of the company is to be continued.

International Wireless Manufacturers, Ltd.—A petition for the winding up of this company has been presented to the High Court by Marconi's Wireless Telegraph Co., Ltd., of Marconi House, Strand, W.C., creditors, and will be heard in London on November 3rd.

Union Electric Welding Co., Ltd.—Winding up voluntarily. Meeting of creditors November 2nd, at 9, Billiter Square, E.C. Particulars of claims to the Liquidator, Mr. L. O. Huggins, 81, Cannon Street, E.C., by November 23rd.

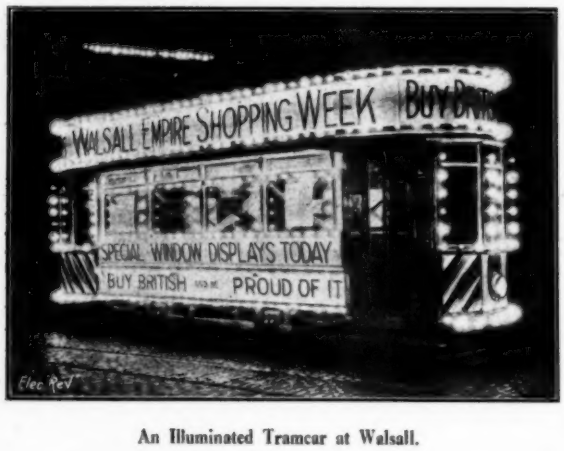
Tredegars, Ltd. (old company).—A meeting of members is called for November 24th at the offices of Messrs. Tansley Witt and Co., 5, Chancery Lane, W.C., to hear an account of the winding up from the joint Liquidators, Messrs. N. Bell and B. B. McCallum.

Dissolutions of Partnership.—Midland Electric Co., electrical factors, 1, Charles Street, Leicester.—Mrs. J. A. Young, and Mr. F. A. Dunmore have dissolved partnership. Mrs. Young will attend to debts.

Hall & Heptonstall, motor and electrical engineers, Somerset Hotel Yard, and 13, Station Parade, Harrogate.—Mr. W. T. Heptonstall and Mr. W. R. Smith have dissolved partnership. Mr. Heptonstall will attend to debts and continue the business under the same style.

Onslow Engineering Co. (Williams & Robertson), mechanical and electrical engineers, 177, Fulham Road, South Kensington, S.W.—Mr. A. W. Williams and Mr. D. W. Robertson have dissolved partnership. Mr. Williams will attend to debts and continue the business under the style of Onslow Engineering Co. (A. W. Williams).

Empire Goods Propaganda by Tramcar.—During the recent Shopping Week at Walsall, the Corporation Tramway Department fitted up one of its cars to encourage the inhabi-



An Illuminated Tramcar at Walsall.

tants to buy Empire products. This car was particularly attractive at night, as the accompanying illustration shows.

Licensing Indian Electrical Contractors.—An amendment to the rules promulgated by the Government of Bombay for the licensing of wiremen and electrical contractors provides that a register of all electrical contractors and wiremen shall be maintained by the Electrical Engineer to the Government. The licences and certificates shall be renewable annually, failure to renew them will render them liable to cancellation, and the full fee for a fresh licence or certificate will be charged. The fee for such renewals shall be: Licence as electrical contractor, Rs. 10 per annum; Class I certificate of competency, Rs. 5 per annum; and Class II certificate of competency, Re. 1 per annum.

Licensing Contractors in New South Wales.—The *Sydney Evening News* reported recently that regulations for the licensing of electrical contractors as redrafted, had been forwarded to the Government. The proposal was that licences should be issued as from October 1st, and should remain in force for 12 months. On and after November 1st it will be illegal for any person to undertake electrical installation unless he is the holder of a licence or is employed by the holder of a licence who has contracted to carry out the work. Provided no further delay occurs on the part of the Government in gazetting the regulations, the Act should be in complete operation by November 1st.

Polish Contract for Czecho-Slovakia. — The Ceskomoravska-Kolben Co., of Prague, has recently secured a contract for the establishment of an electric power station in the town of Przemysl.

Swedish Apparatus Exports.—The *Swedish Economic Review* states that the exports of telegraph and telephone apparatus from Sweden during the period January-August, 1925, were valued at 4,475,000 kr., as compared with 4,809,000 kr. in the equivalent period of 1924.

Book Notices.—"The Confessions of a Capitalist," by Sir E. J. P. Benn, Bart. London: Hutchinson & Co. 18s. net. —We confess to a difficulty in writing about this book for there are so many things that we might say, if we had the space to spare, concerning both the author himself and what he says about himself. We began by wondering why it was written and what justification there could be for a comparatively young man in the midst of life's activities sitting down to write about so many trifles connected with his own unbringing, his schemes, failures, and successes. One recovers from this as one passes on through its very easily read chapters and gets accustomed to the free use of the first person singular. Really it is the kind of story that ten thousand other business men might have written about the difficulties of doing business nowadays, for we have all been in the same boat since the war. Those most likely to be interested in the parts of the book dealing with his business in trade journals, his few successes and his many losses, are trade journalists and newspaper proprietors who have walked contemporaneously with the author, since his father (upon whom the baronetcy was conferred toward the end of his life, for much public service), initiated him into this department of activity. How far the general reader is interested in such matters we do not pretend to know, but there is much that is entertaining and informative relating to the science and conduct of business and to the way in which private enterprise is penalised and throttled and trade and employment are hampered by the conditions which prevail to-day. That part of the story, and especially the account of some of the disastrous effects of heavy taxation, is well told and should be widely read. It tells of many things that the great majority of the people know nothing about, and it tells them in a straightforward and interesting way. But many of those who ought to read these things cannot afford the price of the book—not being capitalists themselves. Editors are sometimes asked to advise their readers candidly whether a certain book is one to buy or one to borrow. Those who are in a position to borrow will not need any guidance; others will probably buy it and then pass it on, pleasing the author by giving the widest circulation possible to his story.

The Autumn List of books published by Sir Isaac Pitman and Sons, Ltd., contains many titles, with brief descriptions, of books dealing with a wide variety of electrical subjects.

"The Activities of Vickers, Ltd.," is the title of a brochure published by the company named to inform the public of its many important works. Among the activities dealt with are the production of ordnance, the building of battleships and aeroplanes, the construction of motor bodies, gas engines, condensers, &c. The illustrations are numerous and effective.

"Tables and Graphs for Facilitating the Computation of Spectral Energy Distribution by Planck's Formula" (seven sheets, five charts).—Bureau of Standards. Washington: Government Printing Office. 35 cents.

"Science Abstracts A and B." Vol. XXVIII. Part 10. October 25th, 1925.—London: E. & F. N. Spon, Ltd. Price 3s. each.

German Radio Enterprise in Turkey.—The *Financial News* reports the formation of the Elektro-Radio Société Anonyme Turque in Constantinople, with a capital of £T300,000, to undertake the manufacture of electrical instruments, &c., and to carry on broadcasting and radio-telegraphy. German capital and enterprise have taken a large participation in the new concern, among the firms represented being the Siemens-Schuckertwerke, Siemens & Halske, the Telefunken Co., and the Dr. Eric F. Huth Gesellschaft.

New German Customs Tariff.—With the issue of the *Board of Trade Journal* dated October 15th was published a complete translation of the new German Customs tariff which was put into force on October 1st. The publication can be obtained from the Stationery Office at 6d. net.

New Australian Company.—Among the recently-formed Australian companies is Condor Lamp (Australasia), Ltd., with a capital of £25,000.

Hungarian Electrical Exports. — During the second quarter of the current year 8,224 quintals of electrical goods and apparatus was exported from Hungary. The principal customers were Italy (1,490 quintals) and Jugo-Slavia (1,152 quintals); the British share was too small for separate classification. Over half of the total was represented by machinery (generators, transformers, &c.).

Norwegian Transformers for Australia.—According to *Commerce Reports* the Norwegian A/S National Industri recently secured a contract for the supply of approximately 300,000 crowns' worth of transformers to Australia.

The Finnish Electrical Market.—*Commerce Reports* says that, generally speaking, Finland holds considerable promise of future development as a market for electrical wiring material, but its growth will necessarily be slow. The price factor in a country where money is comparatively scarce and the market limited is usually the deciding one. The material at present employed is predominantly of German make or at least of German design.

British Tenders for Budapest Scheme.—According to the Budapest newspapers, tenders for the supply of electric power for the city of Budapest have been received, not only from the Dutch-American group, but also from the Armstrong and Vickers groups. All these groups, it is added, declare their readiness to take over the foreign debts of the city of Budapest and promise reductions in the charges for the supply of power varying from 20 to 40 per cent. of the present rates.—*Reuter* (Budapest).

Proposed Russian Purchases Abroad.—The Supreme Council of National Economy of the United Soviet Socialist Republics announces that it is sending abroad, especially to Germany, France, England, and America, twelve commissions, representing various branches of industry, such as the electro-technical, oil and metal sections, invested with extensive powers to purchase equipment for the industries concerned, to a total amount of 270,000,000 roubles, subject to credit being granted up to three years.—*Reuter* (Moscow).

New Western Electric Showroom.—The Western Electric Co., Ltd., has recently opened a new showroom at Livery Street, Birmingham. The accompanying reproductions of photographs show the room to be well laid out, and the exhibits to be very representative of the company's products. Fig. 1 is a view of the section devoted to domestic electrical equipment, the principal objects being a vacuum cleaner, a washing machine, and an ironer, while a number of table

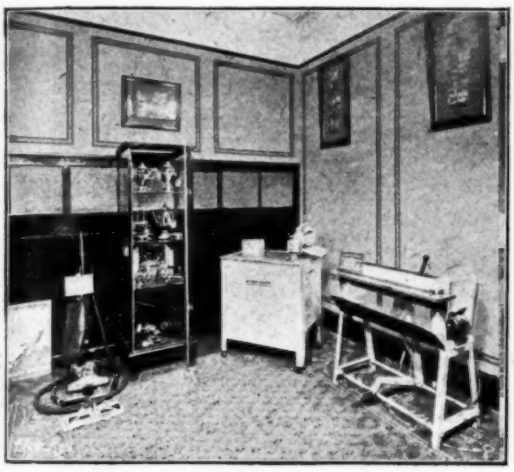


Fig. 1.—The Domestic Section.

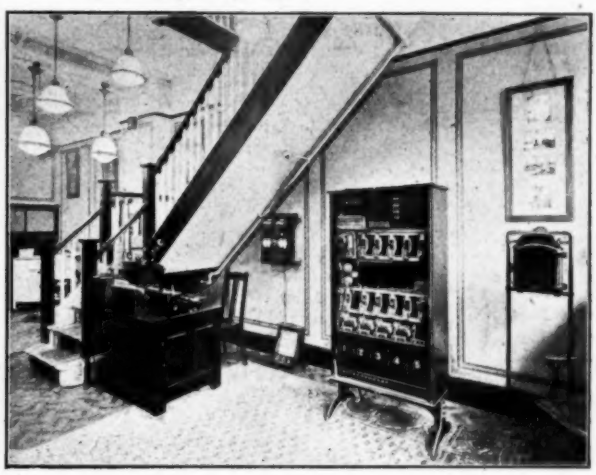


Fig. 2.—The Telephone Section.

Western Electric Showroom at Birmingham.

appliances and other electrical devices are housed in a showcase. The other view (fig. 2) is of the telephone section. This contains a great deal of intercommunication equipment, as well as radio-telephone sets and accessories, including "Igranic" devices. The new showroom is under the control of Mr. J. Entwistle, the company's Birmingham manager.

Argentine Crane Contract.—A contract for 129 electric cranes for the new harbour in Buenos Aires is reported to have been secured by a German firm at a price which was lower than the offers made by other German firms, and from 10 to 15 per cent. lower than the tender prices of English and American competitors.

Belgian Enterprise in Turkey. — Under the title of the Société Turque de Gaz et d'Electricité à Constantinople, a company has been formed in Brussels under the auspices of the Empain group to resume the gas concession in Stamboul and the gas and electricity concessions on the Asiatic side of Constantinople, as well as to undertake the establishment and working of other industrial undertakings in Turkey. The company, whose statutes have been approved by presidential decree of the Government of Turkey, has an initial capital of £T1,000,000. Belgian electrical and financial companies are among the chief subscribers of the capital.

American General Electric Progress.—The president of the General Electric Co. (United States) recently announced that the value of the orders received by his company during the third quarter of the current year was $73,561,483—an increase of 26 per cent. when compared with the September quarter of 1924. For the first nine months of the year the total value of orders has been $223,876,711—an increase of 10 per cent. over the figure for January-September, 1924.

French Lamp Propaganda.—Ten French manufacturers of electric lamps have recently embarked on a joint publicity campaign urging the French public to "support French industry by buying only electric lamps which are really French."

New French Companies.—A new company has lately been formed at Wolfisheim, Lower Rhine Province, with a capital of 1,200,000 fr., and the title Le Société "Meti," Fabrique de Matériel Electrique, Téléphonique et Industriel.

La Société de Distribution Rurale d'Energie Electrique is the name of a new company which has lately been organised at Ruffec (Charente) with a capital of 350,000 fr.

The Embargo on Foreign Loans.—The Federation of British Industries has made representations to the Governor of the Court of the Bank of England urging upon him some relaxation in the present attitude of the Bank with regard to foreign loans issued in this country. At the present moment the policy of the Bank is said to constitute a virtual embargo upon such loans and to have a consequent adverse effect upon our export trade. In the past the large annual investment of British capital in oversea countries has played an important part in supporting and developing export trade. It is suggested that if the Bank of England cannot completely abandon the present embargo it should at least permit a partial relaxation in respect of loans of such a character that their proceeds would largely or wholly be expended immediately in this country in the purchase of British goods.

Unemployment.—There was a further decrease of 20,925 in the total of registered unemployed during the week ended October 19th, the number at that date being 1,237,900. This compares with about 1,204,000 at the equivalent period of last year.

Employment During September.—The October *Ministry of Labour Gazette* states that employment in the engineering industry during September continued bad on the whole, the general figure of unemployment being 11.6 per cent., a decrease of 0.2 per cent. as compared with August and 1.9 per cent. in comparison with September, 1924. In the electrical branch employment remained fairly good, the unemployment percentage being 5.7, a decrease of 0.2 per cent. as compared with August, although it was higher by 0.5 per cent. than in September, 1924. There were also slight decreases in unemployment in the electrical wiring and contracting industry and in electrical cable, wire and lamp manufacture.

New Municipal Showrooms and Offices.—The new Southport electricity showrooms at the Glaciarium, Lord Street, were recently opened. The administrative offices and showrooms are on the street frontage; the first and second floors are occupied entirely by offices for the technical and clerical staffs and a large room which is to be used as a lecture hall for the demonstration of electric cooking, washing, ironing and vacuum cleaning. This room is fitted with a large platform at one end, and is set out as a model kitchen. The body of the lecture hill is fitted with tip-up seats for about 50 persons, although the room will comfortably accommodate 100 persons at any one time. As in the showrooms, the whole of the ceiling is fitted with special adaptors for the easy fixing of all classes of lighting fittings. The skirting boards round the room have been fitted with numerous sockets for supplying current to all classes of electric appliances which are exhibited and demonstrated in this room. Appliances bought from the showrooms and valued at £3 or over can be obtained on the hire-purchase system. In the windows the latest systems of concealed lighting are employed. The showrooms include a model electrically-equipped house. The kitchen contains electric ovens, complete with grills and boiling plates. There is also a thermostatically controlled heating cistern over the sink. In the dining room there is a "Magicoal" electrical fire. In this room are displayed the latest styles of illumination, toasters, plate warmers and tea infusers.

The Electricity Committee of the Paisley Town Council is to erect buildings in Moss Street at a cost of £5,500 for electricity offices, a showroom, and meter shop.

New Belgian Company.—La Société d'Electricité de la Région de Malmedy is the name of a new company which has lately been formed in Brussels with a capital of 40 million francs.

New Swiss Company.—A new company has lately been formed at Lessoc, Canton of Fribourg, with the title Le Société Electro-Métallurgique Procédés R. Neveu, to acquire and exploit the Neveu electro-metallurgical patents.

For Sale.—By direction of the Air Ministry, Messrs. Horne & Co. will sell by auction on November 9th and the following days, at the Air Ministry Works and Buildings Stores Depôt, Watford, machinery, machine tools, generating and wireless plant and stores. Rawtenstall Corporation electricity department has for disposal surplus generating plant, &c. (See our advertisement pages to-day.)

Local Exhibitions.—An exhibition promoted by Paisley Corporation Electricity Department, in conjunction with local electrical contractors, was formally opened at the Town Hall, Paisley, on October 20th. This was the third venture of its kind to be held in the town. The Electricity Committee organised the display, and the following companies exhibited: The General Electric Co., Ltd.; Metro-Vick Supplies, Ltd.; Messrs. Kennedy, Stark & Co.; and Messrs. J. Kilpatrick and Son, Ltd.

Leeds.—A "Better Homes" Exhibition, organised by the *Leeds Mercury*, was held last week at the Fenton Street Drill Hall, Leeds. It included electric labour-saving appliances for domestic use. The exhibition was opened by the Lord Mayor and Lady Mayoress of Leeds, and there were some 60 exhibitors.

Wakefield.—Under the auspices of the Wakefield Corporation Electricity Department, an all-electrical exhibition, open to the public free, was held at the Bank Street Drill Hall, from October 19th to 24th. The exhibition was opened by the Mayor, and included the most modern applications of electricity for heating and cooking, with working examples of domestic appliances, especially washing, ironing and sewing machines. Electric cooking demonstrations were given daily, and for the benefit of local textile traders an electrically-driven "Dobcross" loom was running. The exhibitors were the Wakefield Corporation; the British Electric Transformer Co., Ltd.; the English Electric Co., Ltd.; Credenda Conduits, Ltd.; J. E. Fowler, Wakefield; the Hotpoint Electrical Appliances Co., Ltd.; the Hurley Machine Co.; Hutchinson, Hollingworth & Co., Ltd.; the Jackson Electric Stove Co., Ltd.; Walter Robb, Ltd., Wakefield; the Siemens & English Electric Lamp Co., Ltd.; and Singer's Sewing Machine Co., Ltd. Loan apparatus on the Corporation stand included appliances from W. E. Beardsall & Co., Ltd., Berry's Electric, Ltd., the Electrical Apparatus Co., Ltd., the English Electric Co., Ltd., Geo. Nobbs, Ltd., the Morgan Crucible Co., Ltd., Premier Electric Heaters, Ltd., and Young, Osmond & Young, Ltd.

New Austrian Company.—It is reported from Vienna that a new company is being organised under the name of the British-Austrian Metal Corporation, Ltd., to supply an Austrian syndicate with copper and to engage in the sale of cables, copper wire, &c.

German Foreign Electrical Loan.—The Berlin Stadtische Elekrizitatswerke Gesellschaft is reported to have arranged a 7 per cent. loan of £1,200,000 with a Swiss-Dutch syndicate to enable it to carry out further extensions. The interest on the loan, which is to run for a period of fifteen years, is being guaranteed by the Berlin Municipal Council.

Radio Transformer Price Reduction.—The Marconiphone Co., Ltd., informs us that it intends to reduce the prices of its "Ideal" radio transformers on November 1st.

The German Porcelain Insulator Industry.—According to a report just to hand, German manufacturers of porcelain for high-pressure insulation purposes are at present busily employed both on home and foreign orders. It is stated that several concerns now require long periods for delivery, while prices are stated to be satisfactory. On the other hand, makers of similar material for low-pressure insulation purposes are suffering from severe price competition. This is due partly to Czecho-Slovakian competition and partly to the fact that during the period of money inflation, the productive capacity was increased to an abnormal extent.

Lighting and Power Notes.

Aberdeen.—Year's Working.—The report on the working of the City Council's electricity undertaking (engineer: Mr. J. A. Bell) for the year ended July 31st last records a total income of £198,502, as compared with £187,874 in the preceding year. Operating expenses increased from £95,048 to £106,005, leaving a gross profit of £92,497 (£92,826). After deducting capital charges there remained a net surplus of £23,357, as against a surplus of £19,225 in 1923-24. The amount spent on capital account during the year amounted to £103,726, the chief items being £44,866 for machinery and £43,828 for mains and services. The electrical energy sold increased from 24,019,143 to 26,458,959 kWh. A 10,000-kW turbo-generator was put into commission during the year, and sanction was received to the installation of an additional set of a similar capacity. The number of heating and cooking appliances let out on hire increased by 666, making a total of 5,163.

Ashton-under-Lyne.—Extension of Supply.—The extension of the Corporation's electricity supply to the Hurst and Limehurst area was recently formally inaugurated. Electricity is transmitted from the generating station to a sub-station in Mossley Road at a pressure of 6,000 V a.c., where it is reduced to 3,000 V for distribution to various transformer pillars, which again reduce it to 240 V for lighting and 480 V for power.

Australia.—Sydney.—*Year's Working.*—The report on the working of the City Council's electricity undertaking (engineer: Mr. H. R. Forbes Mackay) for the year 1924 shows a total income of £1,611,767, as compared with £1,352,819 in the preceding year. Working expenses were £841,828, as against £740,893, leaving a gross profit of £769,939 (£611,926). Capital and other charges increased from £518,164 to £562,668, and there was a net surplus of £207,271, as compared with £93,762 in 1923. The capital expenditure during the year amounted to £739,730, and included £219,680 for machinery and plant at the power station, £90,311 for sub-station plant, and £244,077 for underground and overhead mains. The electrical energy generated amounted to 199,645,000 kWh, and 21,865,418 kWh was purchased from the Railway and Tramways Department. The sales of electrical energy amounted to 188,425,931 kWh, an increase of 30,729,175, or 19.49 per cent., and the average price obtained increased from 1.929d. to 1.946d. The maximum supply demanded rose from 51,200 to 60,060 kW. The new generating plant added during the year comprised two turbo-alternators, one of 17,500 kW, and one of 12,000 kW, bringing the capacity of the plant at the Pyrmont station up to 75,000 kW. Two new boiler houses were completed and three additional boilers, together with coal and ash handling plant, were put into operation. Totals of 23 miles of feeder cables, 168 miles of l.p. mains, and 55 miles of street lighting mains were put into service during the year.

Barnsley.—Loan.—The Town Council has received sanction to a loan of £5,230 for mains in the added areas of supply.

Bedford.—Loans.—The Corporation has received sanction to loans of £5,000 for sub-station equipment; £4,000 for buildings; £12,000 for plant at the generating station; and £15,000 for mains, transformers, and switchgear. Application is being made for sanction to the borrowing of £1,000 for a water purifier, £5,000 for meters, and £3,000 for domestic apparatus to be let out on hire.

Brandon (Co. Durham).—Loan.—The Urban District Council has decided to install prepayment meters in the Council houses at an estimated cost of £1,137, and is applying for sanction to the borrowing of this amount.

Caine.—Electricity Supply.—At the October meeting of the Town Council, the Gas Committee reported having considered the question of an electricity supply, and stated that the business streets of the town had been canvassed with encouraging results, and that that portion of the scheme could be carried out at a capital cost of from £2,500 to £3,000. The Council decided to invite tenders for the work.

Canada.—Hydro-Electric Development.—The North Shore Power Company, a subsidiary of the Shawinigan Water and Power Company, is now completing the harnessing of 20,000 h.p. at the Cheminée Falls, on the Batiscan River. This power will be available very shortly, and is derived from waterfalls which were leased from the Quebec Government.

The additions to the plant of the British Columbia Electric Railway Company at Stave Lake, which have been in hand for the past two years, have been completed. The power now available from that source amounts to 87,500 h.p. The additions have cost approximately $3,720,000. Announcement has recently been made by the president of the company that plans are completed to start immediate development of a power scheme on Bridge River, 135 miles north of Vancouver, on the Pacific Great Eastern Railway. The installation of the first sets, to cost $13,000,000 and to provide 60,000 h.p., will be started at once and should be completed in five years. Later the plant will be increased by an additional 70,000 h.p., at an expenditure of $30,000,000, the work to be spread over 15 years.

Continental. — Belgium. — Seventeen electricity supply undertakings are now associated with the Société de l'Union des Centrales Electriques, the object of which is to link up the various power stations in Belgium. The total power of the 21 power plants now interlinked is 112,500 kW. A considerable amount of the energy is generated by means of internal-combustion engines run by the waste gases from the blast furnaces in the district, and it is estimated that by this means a saving of 53,000 tons of coal was effected during the past year.

France. — A concession has lately been secured by the Société des Forces Electriques de la Vallée de Gavarnie to establishe a plant to utilise certain falls on the River Gavarnie, near Luz, in the Upper Pyrenees, for the generating of electricity. It is estimated that 34,500 kW is available.

Dunfermline.—Electricity in Small Houses.—The Corporation Housing Committee, having considered the respective costs of gas and electricity for lighting in connection with its housing scheme, has recommended the installation of electric lighting, and at the last meeting of the Town Council the recommendation was agreed to.

Eston.—LOAN.—The Urban District Council is applying for sanction to a loan of £14,000 for electricity extensions.

Garw.—INAUGURATION OF SUPPLY.—The Urban District Council's electricity supply was recently formally inaugurated. Electricity is obtained in bulk from the South Wales Power Co., at a pressure of 11,000 V.

India.—POONA.—In order to meet the demand for additional electricity supplies in its area, the Poona Electric Supply Co. is to install two 600-b.h.p. Tosi engines direct-coupled to 400-kW generators. A new power house to accommodate the additional plant is nearing completion.—*Indian Textile Journal.*

Keighley.—EXTENSION OF SUPPLY.—The Town Council is to apply for authority to supply electricity in the districts of Silsden, Cowling, Farnhill, Glusburn and Kildwick. Application is also being made for sanction to a loan of £50,000 for mains and services. The application of the Electrical Distribution of Yorkshire, Ltd., for a Special Order to supply in the districts above named is to be opposed.

Liverpool.—"ALL-ELECTRIC" HOUSES.—The Corporation Housing Committee is erecting 250 "all-electric" houses.

London.—HAMMERSMITH.—*Year's Working.*—The accounts of the Borough Council's electricity undertaking (engineer: Mr. F. Hill) for the year ended March 31st last show a revenue of £193,726, as compared with £179,135 in 1923-24. Working expenses amounted to £112,984, as against £99,640, leaving a gross profit of £80,741 (£79,494), to which was added income from other sources making a total of £81,843. Capital and other charges absorbed £65,584, and there was a net surplus of £16,258, as compared with £15,434 in the preceding year. Out of the accumulated profits a contribution of £15,080 was made to the borough fund. The capital expenditure during the year amounted to £23,444, of which £17,091 was spent on mains' extensions, services, meters, and transformers. The sales of electrical energy increased from 20,126,879 to 24,485,903 kWh, and the average price obtained fell from 2.136d. to 1.898d. The maximum load rose from 12,440 to 13,200 kVA.

STOKE NEWINGTON.—The Electricity Committee has recommended to the Borough Council that the following revised terms for a buik supply of electricity from the North Metropolitan Electric Power Supply Co. be accepted:—£5 per kW per annum, with a "unit" charge of ½d. for the first 250,000 kWh, and .4d. for all energy in excess of this amount.

HORNSEY.—The Borough Council has received sanction to a loan of £23,850 for the installation of a 3,000-kW set.

Lowestoft.—LOAN SANCTIONED.—The Electricity Committee has obtained sanction to borrow £3,300 for the provision of a new feeder cable to Oulton Broad.

Luton.—LOANS.—The Corporation is applying for sanction to loans of £10,000 for mains and £300 for switchgear. Sanction has been received to the borrowing of £2,000 for the provision of automatic stokers.

Newhaven.—SPECIAL ORDER.—The Brighton Town Council is applying for a Special Order to supply electricity to Telscombe Cliffs, in the area of the Rural District Council. The main is to be extended from the Rottingdean boundary to the main sewer outfall at Portobello, for the purpose of supplying electricity for operating pumping plant which is to be put down there. A sub-station is to be erected, and provision made for supplying electricity to premises when the Telscombe Cliffe Estate is developed. The maximum charges proposed are 9d. per kWh for lighting and 3d. per kWh for power.

Northern Ireland.—WHITEHEAD (CO. ANTRIM).—A Lighting Committee has recently been formed to consider a proposal to introduce electricity for public lighting.

LONDONDERRY.—In order to utilise the spare generating plant and electricity supply available owing to the closing down of the local shipyard, the city electrical engineer proposes the adoption of a combined (alternative) lighting, heating, and cooking rate for private houses. In this way it is hoped to secure a substantial increase of revenue without involving any additional expenditure for services or meters.

Preesall.—LOAN.—At a recent meeting of the Town Council a communication was received from the Electricity Commissioners regarding the Council's application for sanction to borrow £14,000. The application was granted in respect of mains, but further information was required regarding services and transformers.

Portsmouth.—LOAN SANCTIONED.—The Town Council has received sanction to a loan of £11,000 for the erection and equipment of a sub-station at Fratton in connection with the supply of electricity to the tramway.

Price Reductions.—Reductions in the charges for electricity have been made or recommended in the following districts:—

BUXTON.—Lighting: Flat rate—Varying from 6½d. to 5d. per kWh, according to the quantity consumed. Two part tariff—From dusk to midnight, rates as above; remainder of the day 3½d. per kWh. Heating and cooking: Varying from 3d. to 1½d. per kWh according to quantity consumed. All charges subject to a discount of 2½ per cent. for prompt payment.

SOUTH SHIELDS.—Rateable value system: For the winter quarters, 6d. per kWh for 3 kWh per £ of rateable value, and for the summer quarters, 6d. per kWh for one kWh per £ of rateable value. All energy in excess of these amounts 1d. per kWh.

Sheffield.—LOANS SANCTIONED.—The Electricity Committee has sanctioned loans of £1,403 for sub-stations in Cavendish Avenue, Rashley Road, and Mickley Lane, and £13,162 for the extension of mains to the Manor Housing Estate.

Seaham Harbour.—PROPOSED ELECTRICITY SCHEME.—The Urban District Council has received a report from its consulting engineer on the proposed electricity scheme for the district. It is proposed to take a supply from the County of Durham Electric Supply Co., which has a 20,000-V supply at Stoney Cut sub-station, near Seaham Harbour. The cost of the scheme would be £16,600, and the estimated charge to consumers 7d. per kWh for lighting and 3d. and 3½d. for power. The Council is applying for a Special Order authorising it to distribute electricity in its area.

Skegness.—PROPOSED ELECTRICITY SCHEME.—At the next meeting of the Town Council the question of installing electricity generating plant is to be considered.

Southport.—PURCHASE OF DOMESTIC APPLIANCES.—The Corporation is applying for sanction to a loan of £5,000 for the purchase of electrical domestic appliances to be let out on hire.

South Warwickshire.—SPECIAL ORDER.—The Electricity Commissioners have submitted to the Minister of Transport for confirmation a Special Order made by them authorising the Leamington & Warwick Electrical Co., Ltd., to supply electricity in the rural districts of Southam, Stratford-on-Avon, and Warwick.

United States.—HYDRO-ELECTRIC DEVELOPMENT.—According to *Power*, the Mt. Shasta Power Corporation has applied for a licence covering Pit No. 4 site on Pit River, near Reading, California. The power is to be sold to the Pacific Gas and Electric Co. The development will make available 56,880 h.p. primarily. It is proposed to install three 40,000-h.p. generators.

A water-power enterprise is contemplated in two applications filed in Oklahoma City for permits to dam the Grand River in eastern Oklahoma. They are the Oklahoma Hydraulic Co. and the People's Public Service Corporation. Plans call for the erection of three dams. One below Miami would be 155 ft. high. It is stated that 275,000 h.p. would be developed.

The Carolina Power Co., of Sanford, N.C., is to erect a hydro-electric plant of about 40,000 h.p. Construction will start within the next few months.

Walsall.—LOAN.—The Electric Supply Committee has decided to apply to the Electricity Commissioners for sanction to borrow £30,000 for extensions of electricity mains.

Tramway and Railway Notes.

Aberdeen.—TRAMWAY EXTENSIONS.—The Corporation is to borrow £125,000 for tramway extensions. £2,500 is required for the electrical equipment of depôts.

Blackpool.—YEAR'S WORKING.—The report of the manager of the Corporation tramway undertaking (Mr. C. Furness) for the year ended March 31st last shows a revenue of £272,420, and a working expenditure of £196,162, leaving a gross profit of £76,258. The figures for the previous year were: Revenue, £273,657; working expenses, £184,021; gross profit, £89,636. A deficiency of £165 on the motor-omnibus service was deducted from the surplus, and to it was added bank interest of £3,663 and a contribution of £83 from Lytham-St. Annes Corporation in respect of capital outlay at Adelaide Place terminus, making a total of £79,839 available. Capital charges, &c., absorbed £38,018, and the result was thus a net surplus of £41,820, as compared with £53,093 in 1923-24. This was added to a balance of £43,621 from the previous year, making £85,442. Sinking fund contributions amounted to £21,590, £15,000 was devoted to the borough fund, £25,621 transferred to renewal and reserve funds, and a balance of £23,230 was carried forward. The capital expenditure, which included £41,602 for permanent way, amounted to £52,419. The car-mileage increased from 2,605,269 to 2,691,698, and the passengers carried from 37,981,507 to 40,943,713.

Glasgow.—NEW ROUTE.—The Tramways Committee has approved proposals for laying a tramway track on the Anniesland-Duntocher road.

Leeds.—NEW ROUTE.—It was reported at a recent meeting of the Tramways Commitee that the new tramway to Middleton is nearly complete, and is expected to be available for service before the end of November.

DEPOT EXTENSION.—The committee has decided to enlarge the central tramway depôt in Swinegate. The present accommodation is for 55 cars, and it is proposed to extend it to accommodate 200 cars.

London.—OLD STREET STATION.—Escalators having been put into commission at Old Street underground station, the work on the dismantling of the lifts and the construction of

the new booking hall is to be commenced. The hall will have a circulating area of 2,050 sq. ft., and the work is expected to be finished early next year.

Through-Running.—The Highways Committee of the London County Council has recommended that an agreement be entered into with the Walthamstow Urban District Council for the through-running of tramcars between Liverpool Street and Chingford Mount.

Tramway Extension.—In connection with the extension of the tramway from Southend Village to Grove Park, the L.C.C. Highways Committee has recommended the expenditure of £33,875 for the extension of the tramway track from Bromley Road to connect with the portion at Downham, and £30,095 for the provision of electrical equipment, feeder pillars, ductwork, &c.

Newcastle-on-Tyne.—Purchase of Undertaking.—The Corporation Transport and Electricity Committee is considering the question of purchasing the undertaking of the Tyneside Tramways and Tramroads Co., with a view to amalgamating it with the city system. If agreement is is reached between the Corporation and the company, it is expected that Parliamentary powers will be sought in the Bill which is at present being promoted.

Sheffield.—New Cars.—The Corporation Tramways Committee is to introduce fifty new tramcars on its system.

Stockton-on-Tees.—Tramway Improvements.—The Joint Tramways Committee has instructed the tramways manager, in conjunction with the borough engineer of Thornaby, to prepare for submission to the next meeting of the committee an estimate of the cost of the proposed doubling of the tramway track in Middlesbrough Road.

Swansea.—Transport Scheme.—The Corporation Tramways Committee has considered three schemes, submitted by the borough electrical engineer, for carrying passengers to the Townhill estate, together with approximate estimates of costs, as folows:—A double track of tramways at a cost, exclusive of cars, of £27,000; cable tramway consisting of two cars driven by an electric motor on the top of the hill at a cost including cars of £24,000; a "Never-Stop" railway at a cost of £20,000. The committee has recommended the installation of a funicular railway, and has asked the borough engineer and the electrical engineer to prepare an estimate of the cost.

York.—"One-Man" Cars.—The Corporation Tramways Committee is experimenting with a "one-man" tramcar designed the city tramway engineer, Mr. J. A. Bromley, in collaboration with the English Electric Co., Ltd. The car is of the single-deck type, carrying 24 passengers, and if proved successful others of the same design are to be constructed.

Telegraph and Telephone Notes.

Canada.—Telephone Service.—It is stated that Canada has 1,009,203 telephones, or 11 for each 100 of her population.

Germany.—Electrophone Service.—The electrophone service which enables ordinary telephone subscribers to listen in their homes to operatic performances has recently experienced considerable technical improvement by the introduction of more efficient microphones in several towns. Hitherto the microphones used for this purpose were of the carbon granule type, and the new microphones with permanent magnets not only transmit with a high degree of purity and uniformity, but considerably reduce the number which it is necessary to use. The new microphones are only hand-size, and their application at the Frankfort Opera House has led, says *The Times*, to satisfactory results. The best results have been obtained by placing one microphone to the right and one to the left of the footlights, two more being placed to the right and left of the conductor. The performances are transmitted over the telephone wires to the Central Telephone Office, which passes them on to the telephone subscribers after amplification.

Railway Telephones.—Automatic System.—The new telephone exchange installed in the Southern Railway's general offices at Waterloo Station is now ready, and from Sunday department will speak to department and station to station by automatic telephony. The automatic system will enable an official at his desk at Waterloo to get 805 London depôts, stations, offices, or outposts without the intervention of any operator. The total cost of the inner London telephone scheme just carried out to the designs of the company's signal and telegraph superintendent, Mr. W. J. Thorrowgood, is £40,000.

Jutland.—Telephone Loan.—The Jutland Telephone Co. has accepted Hambros Bank's offer of a loan of £20,000 sterling at 5½ per cent., guaranteed by the Danish State.

Ships' Radio.—New Installations.—Six vessels owned by the Companhia Nacional de Navegacao Costeira, of Rio de Janeiro, are to be equipped by the Marconi International Marine Communication Co., Ltd., with wireless installations. The equipment for each ship will comprise a 1½-kW quenched-spark transmitter, a 1½-kW continuous-wave valve transmitter, valve receivers for spark and continuous-wave reception, a direction finder, and a broadcast receiver of the marine V4 type designed especially for ships. Loud-speakers operated by the broadcast receiver are to be installed in the music and smoking rooms of each ship. The receiving apparatus includes a four-electrode valve amplifier, and covers the wave-lengths of all the transmitting stations in commercial use. The direction-finding installations will use the new fixed-frame aerial, which obviates the use of posts or jumper stays, and effects a great saving both in space occupied and in cost. In addition to the five broadcast receivers mentioned above, the Companhia Nacional de Navegacao Costeira has purchased from the Marconi International Marine Communication Co., Ltd., twelve more such sets for installation on other ships of its fleet. Orders have also been received from Messrs. Elders and Fyffes, Ltd., for six new vessels to be installed with Marconi 1½-kW installations and fixed-frame direction finders.

Telegraph Conference.—Changes in Rates.—The plenary meeting of the International Telegraph Conference adopted, on October 24th, the increases in telegraph charges recommended by its Tariffs Committee. While the maximum terminal and transit rates chargeable are thus increased to keep pace with the increased working costs, no country is obliged to raise its rates; in practice, rates generally will not be raised except probably in the case of Germany, whose State telegraph systems are working at a loss. Great Britain has come to an arrangement with all European countries that there shall be no increase in the rates to and from Great Britain, except in traffic with France and Germany and in the case of these countries it is not certain that the increases will fall entirely on the public. The foregoing only refers to Intra-European traffic. As regards extra-European traffic, a slight increase in the maximum terminal charges at the European end is authorised, but the rates payable by the public will not be increased, the increases, if imposed by the Governments, being absorbed by the cable companies. The intra-European increases will come into force on April 1st, 1926.—*Reuter* (Paris).

Codes.—The plenary meeting of the International Telegraph Conference on October 21st decided to make no changes at present in the code language, but appointed a committee to report on the subject by next October. This means that the present rules as regards code cipher will remain in force until the next International Telegraph Conference some three years hence.—*Reuter* (Paris).

Telephony in Europe.—Projected New Main Cables.—It is stated that Mr. Jeremiah Smith, League of Nations Commissioner-General for Hungary, has given his consent to the construction of the Hungarian section of the long-distance telephone cable between Budapest and Vienna which the Austrian and Hungarian Governments recently agreed to lay down. The cable will contain 96 wires, as compared with the seven overhead telephone wires at present available, and will give Hungary direct telephone communication with the Western countries of Europe. The work is to be completed by the middle of 1927. The Government has also entered into communication with the Czecho-Slovakian and Yugo-Slav Governments with a view to getting Prague connected up with this great trunk line by a branch through Pressburg (Bratislava) and Belgrade by a branch to be extended eventually to Constantinople.—*Reuter* (Budapest).

Radio Notes.

Daventry.—A Mishap.—The cause of the 12 minutes' interruption in the operation of the B.B. Co.'s high-power station (5 XX) on the 23rd inst. was the presence of an infant mouse between the plates of one of the main condensers.

Experimental Transmission. — Cessation. — The experimental transmission which the B.B.C. has been in the habit of carrying out from one or other of its stations at night after the remainder of the stations have closed down, in order to allow those listeners who wished to do so to hear a distant station without any possibility of interference by near-by stations, was carried out for the last time on October 26th from the Bournemouth station. Such transmission from the "short-wave" stations has been abandoned for the present.

Egypt.—Radio Union.—It is reported that a Union has been formed of Greek enthusiasts with the object, amongst others, of establishing a low-power radio-telephone broadcasting station at Alexandria. Government permission will have to be obtained before the installation can be carried out.

Irish Free State.—Dublin Station.—The first radio broadcasting station in the Free State, which it is hoped will be in operation within the next two months, will be on the outskirts of Dublin. The International Wireless Bureau at Geneva has not yet fixed the wave-length to be used, but its power will be 1½ kW. A second station will be built later at Cork, the main function of which will be the relaying on low-power of the Dublin programmes, although there will be a small studio at Cork also; a landline is being laid between the two stations. The service will be controlled by the Post Office and financed by licence fees; in fact, as the *Evening News* points out, for the past three years owners of receiving sets in the Irish Free State have paid one guinea a year for the privilege of hearing Belfast and other B.B.C. stations. About £10,000 has been collected thus each year, all of which has been absorbed by the post and telegraph department of the Free State Government.

Contracts Open and Closed.

(The date given in parentheses at the end of the paragraph indicates the issue of the "Electrical Review" in which the "Official Notice" appeared in our advertisement pages.)

Open.

Aldershot. — November 3rd. Electricity Department. 1,500 yd. paper-insulated, lead-covered armoured l.p. cable. (October 23rd.)

Australia.—SYDNEY.—November 30th. Public Works Department. Metering equipment for the Barren Jack hydro-electric development scheme and the Kiama-Nowra transmission line.*

MELBOURNE.—December 14th. Electricity Commission of Victoria. 22,000-V insulators. (October 16th.)

Barking.—January 1st. County of London Electric Supply Co., Ltd. Water-tube boilers with mechanical stokers or water-tube boilers with powdered fuel equipment; steam turbo-alternators, condensing plant, and auxiliary apparatus for the Barking power station. (See this issue.)

Belgium.—November 4th. Belgian State Railway authorities (Office de l'Electricité), 25, Rue de la Charité, Brussels. Supply and laying of three lots of underground cables at respectively Bruges, Ypres, and Meirelbeke. Particulars (Cahier des Charges, Special No. 4-536) for 11 fr. 20 c.

November 4th. Belgian Post and Telegraph authorities at La Salle Madeleine, Brussels. Supply and laying of telegraph-telephone or loaded telephone cables between (1) Brussels and Lille, (2) Brussels and La Panne, (3) Brussels and Roosendael, and (4) Brussels and the German frontier at Hergenrath. Particulars (Cahier des Charges Special No. 3-144) for 9½ fr.

Bradford.—November 14th. Tramways Committee. General stores required during year commencing January 1st, 1926. Particulars from Mr. R. H. Wilkinson, general manager, 7, Hall Ings, Bradford.

Carlisle.—November 19th. Electricity Department. L.p. cast-iron piping for condensing water system. (See this issue.)

Dublin.—November 12th. Great Northern Railway (Ireland). Stores for six months (including electrical fittings, lamps, cable, and wire, &c.). (October 23rd.)

Erith.—November 6th. Electricity Department. 100 house-service prepayment meters. (October 23rd.)

Huddersfield.—Electric lighting installation at new premises at 74, Trinity Street. Particulars from Dr. Heanratty, 32, New North Road.

India.—BOMBAY.—November 11th. Bombay, Baroda and Central India Railway. D.c. motors and starting pillars. (See this issue.)

Kingston-upon-Hull.—November 16th. Electricity Department. Two natural draught cooling towers. (See this issue.)

London.—H.M. OFFICE OF WORKS.—November 3rd. Installation of cables, switchboards, &c., and wiring at the Ministry of Pensions Hospital, Orpington. (October 16th.)

November 4th. Electric wiring in conduit at Montagu House. (October 16th.)

METROPOLITAN ASYLUMS BOARD. November 4th. Installation of two new hydro extractors at the Western Fever Hospital, Seagrave Road, S.W.; installation of hot-water heating apparatus at St. Anne's Home, Herne Bay; and installation of automatic telephones at the Downs Hospital for Children, Sutton, Surrey. (October 16th.)

PADDINGTON.—November 3rd. Great Western Railway. Telegraph instruments, electrical apparatus, &c., telegraph ironwork and tools, telegraph drysalterers. November 20th. Electrical wires and cables. (October 16th.)

LONDON COUNTY COUNCIL.—November 2nd. Wiring and fittings for electric lighting at the New Road elementary school, Clapham, S.W. (181 wiring points controlled by 168 switches). (October 23rd.)

November 16th. Reconstruction of electrical switchgear at Shoreditch sub-station. (See this issue.)

SHOREDITCH.—The Borough Council Electricity Committee will shortly invite tenders for a 10,000-kW turbo-alternator and 50,000-lb. boiler.

Manchester.—November 6th. Electricity Committee. One 500-kW fully automatic motor or rotary converter, transformers, switchgear, &c. Three 500-kW fully automatic motor or rotary converters or mercury-vapour rectifiers, transformers, switchgear, &c. (October 16th.)

New Zealand.—HASTINGS.—February 1st. Borough Council. Diesel engine and a.c. generator.*

WELLINGTON.—December 15th. Post Office Stores Department. Key switches.*

Oldham.—November 21st. Electricity Department. Three 12,500-kW turbo-generators and auxiliary plant. (See this issue.)

Southampton.—November 2nd. Harbour Board. Alterations to the electrical equipment of 12 cranes, supply of cables, disconnecting boxes, and switchgear. Specifications from Mr. W. G. Gubbins, clerk, Harbour Offices.

Uruguay.—MONTEVIDEO.—January 7th, 1926. State Electricity Supply Works. 26,000 kilograms of copper wires and cables.*

January 5th. Bare copper wire, quicksilver.*
January 8th. Black and G.I. wire, &c.*
January 11th. 96,000 metres lead-covered wires and cables.*
January 12th. 44,500 metallic and carbon-filament lamps.*
Administration Nacional del Puerto de Montevideo. January 2nd. Machine tools and equipment.*

West Ham.—November 16th. Education Committee. Installation of electric lighting and central heating at the Cumberland Road new secondary school. (October 23rd.)

York.—November 12th. Electricity Department. One 6,000-kW, 3-phase turbo-alternator, with condensing plant, pipework, &c. (October 23rd.)

*Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

Closed.

Aylesbury.—Town Council. Accepted:—
400-kW rotary converter.—Crompton & Co., Ltd.

Bedford.—Town Council. Accepted:—
Alterations to the two existing 1,500-kW turbo-alternators (conversion from 60-cycle, single phase to 50-cycle, three-phase machines) (£700 and £1,200 respectively).—British Thomson-Houston Co., Ltd., and C. A. Parsons & Co., Ltd.

Belgium.—International competition was again experienced last week for a contract for the supply of 2,000 metres of cable to the municipal authorities of Schaerbeek, Brussels, tenders being received from one British (Callender's Cable and Construction Co., Ltd.), one Danish, one Dutch, two French, four German, and four Belgian concerns. The prices ranged from 85,100 to 146,500 fr., the lowest being that of the Nederlandsch Kabelfabriek Maatschappij, of Delft, Holland.

Bournemouth.—Tramway Committee. Accepted:—
Overhead tank for the generating station (£232).—Barrowfield Ironworks, Ltd.

Dorchester.—Lighting Committee. Recommended:—
Bridge-megger testing set (£53).—Evershed & Vignoles, Ltd.

Glasgow.—Corporation. Accepted:—
Electric lighting work at the Elder Park Clinic (£98).—Johnstone, Park and Co.

Government Contracts.—The following Government contracts were placed during September, 1925:—

ADMIRALTY (CONTRACT AND PURCHASE DEPARTMENT).

Battery spares.—Hart Accumulator Co., Ltd.
W./t. boxes.—Player & Mitchell.
Cells.—Fuller's United Electric Works, Ltd.; D.P. Battery Co., Ltd.; Chloride Electrical Storage Co., Ltd.
Electric stationary crane.—T. Smith & Sons (Rodley), Ltd.
80-ton electric crane.—Stothert & Pitt, Ltd.
Electric travelling cranes.—T. Smith & Sons (Rodley), Ltd.; Cowans Sheldon & Co., Ltd.
Electrodes.—Quasi Arc Co., Ltd.
Fuse holders.—Pinnacle Switchgear, Ltd.
Lampholders.—General Electric Co., Ltd.; Edison Swan Electric Co., Ltd.; Rainsford & Lynes, Ltd.; Sperryn & Co.
Electric incandescent lamps.—Edison Swan Electric Co., Ltd.; General Electric Co., Ltd.
W./t. note magnifiers and w./t. transmitters.—Gambrell Bros., Ltd.
W./t. panels.—H. W. Sullivan, Ltd.; Park Royal Engineering Co., Ltd.
Rotary converter transformer.—Ferranti, Ltd.
Transformers.—Johnson & Phillips, Ltd.
W./t. valveholders.—H. W. Sullivan, Ltd.
20 special switchboards, 130 voltmeters.—Park Royal Engineering Co., Ltd.

WAR OFFICE.

Submarine cable.—Siemens Bros. & Co., Ltd.
Distribution boards and couplings.—Simmonds & Stokes, Ltd.
Electric cords.—Callender's Cable & Construction Co., Ltd.
Switches.—General Electric Co., Ltd.
Switchboard panels.—Johnson & Phillips, Ltd.

AIR MINISTRY.

Copper wire (Iraq).—General Electric Co., Ltd.
Internal wiring (Catterick).—T. Clarke & Co., Ltd.
Dynamometer.—Crompton & Co., Ltd.

POST OFFICE.

Repairing batteries.—Portsmouth telephone exchange: D.P. Battery Co., Ltd.
Manufacture, supply, drawing-in and jointing cable.—Chichester-Junction for Worthing: Johnson & Phillips, Ltd. Dorking-Worthing—mechanical tandem junction (Scheme II): W. T. Henley's Telegraph Works Co., Ltd. Holborn-Park, Western-Sloane, Hop-Battersea, Holborn-Western, Primrose Hill-Hampstead Junction and Primrose Hill Junction—mechanical tandem junction (Section II): Western Electric Co., Ltd. Canterbury-Dumpton Gap (Kent)—mechanical tandem junction (Section II): Siemens Bros. & Co., Ltd. Brentwood-Marks Tey: Pirelli-General Cable Works, Ltd.
Manufacture, supply, laying and jointing, &c., submarine cable—Anglo-Belgian (1926).—Siemens Bros. & Co., Ltd.
Cabling and wiring for lifts, conveyers, &c., Mount Pleasant new letter-sorting office.—Pinching & Walton.
Conveyors: Mount Pleasant sorting office.—H. Simon, Ltd.
E.h.p. switchgear: Mount Pleasant sub-station.—British Thomson-Houston Co., Ltd.
Private branch exchange equipment.—Vulcan Foundry, Ltd. (Newton-le-Willows); Jarrett, Rainsford & Laughton, Ltd. (Birmingham); Bilsland Bros., Ltd. (Glasgow); Taylor's Drug Co., Ltd. (Leeds); Bank of London & South America, Ltd. (E.C.2): Relay Automatic Telephone Co., Ltd.
Telephone exchange equipment.—Popesgrove (Twickenham): Siemens Bros. & Co., Ltd. Hampstead and York: Automatic Telephone Manufacturing Co., Ltd.
Telephone repeater station equipment.—Glasgow, Gloucester, Newport (Mon.), Marks Tey: General Electric Co., Ltd.
Telephone apparatus.—Automatic Telephone Manufacturing Co., Ltd.; British L.M. Ericsson Manufacturing Co., Ltd.; General Electric Co., Ltd.; Phœnix Telephone & Electric Works, Ltd.; Siemens Bros. and Co., Ltd.; Sterling Telephone & Electric Co., Ltd.; Telegraph Condenser Co., Ltd.; Western Electric.

Battery parts.—Alton Battery Co., Ltd.; D.P. Battery Co., Ltd.; Tudor Accumulator Co., Ltd.
Battery boxes.—W. & T. Lock.
Telephone cabinets.—Siemens Bros. & Co., Ltd.; W. Duncan, Tucker and Co., Ltd.
Cable.—B.I. & H. Cables, Ltd.; Callender's Cable & Construction Co., Ltd.; Connollys (Blackley), Ltd.; Enfield Cable Works, Ltd.; W. T. Glover & Co., Ltd.; W. T. Henley's Telegraph Works Co., Ltd.; Hackbridge Cable Co., Ltd.; Johnson & Phillips, Ltd.; Pirelli-General Cable Works, Ltd.; Siemens Bros. & Co., Ltd.; Union Cable Co., Ltd.; Western Electric Co., Ltd.
Joint box castings.—J. Williamson & Co., Ltd.
Porous cells.—General Electric Co., Ltd.
Telephone cords.—B.I. & H. Cables, Ltd.; Phœnix Telephone & Electric Works, Ltd.; Siemens Bros. & Co., Ltd.
Loading coils.—General Electric Co., Ltd.; Western Electric Co., Ltd.
Cable drums.—B.I. & H. Cables, Ltd.; Eames Bros.; Siemens Bros. and Co., Ltd.
Ducts.—Albion Clay Co., Ltd.; Donington Sanitary Pipe & Fire Brick Co., Ltd.; Hepworth Iron Co., Ltd.; H. R. Mansfield, Ltd.; J. Oakes and Co. (Reddings Collieries, Ltd.); Oates & Green, Ltd.; Stanley Bros., Ltd.
Ear pieces.—North British Rubber Co., Ltd.
Electric light fittings.—Cable Accessories Co., Ltd.; W. White & Co.
Electric lamps.—B.I. & H. Cables, Ltd.; British Thomson-Houston Co., Ltd.; Cryselco, Ltd; Edison Swan Electric Co., Ltd.; General Electric Co., Ltd.; Metro-Vick Supplies, Ltd.; Siemens & English Electric Lamp Co., Ltd.
Distribution cable plugs.—Siemens Bros. & Co., Ltd.
Electric trucks.—W. Goodyear & Sons, Ltd.
Wood troughing.—Calders, Ltd.
Bronze and copper wire.—Elliott's Metal Co., Ltd.
G.I. stranded wire.—Dorman, Long & Co., Ltd.; F. Smith & Co. (Wire Manufacturers), Ltd.
Zinc rods.—Eyre Smelting Co., Ltd.; Locke, Lancaster & W. W. & R. Johnson, Ltd.

H.M. Office of Works.

Wiring Royal Courts of Justice, Strand, W.C.—Electrical Installations, Ltd.

Crown Agents for the Colonies.

Lux cells.—Chloride Electric Storage Co., Ltd.
Electric walking crane.—Ransomes & Rapier, Ltd.
Electric cable.—B.I. & H. Cables, Ltd.
Electric generating plant.—Lancashire Dynamo & Motor Co., Ltd.
Electric switchgear.—Metropolitan-Vickers Electrical Export Co., Ltd.
Electrical materials.—Siemens Bros. & Co., Ltd.
Ceiling fans.—Veritys, Ltd.
Porcelain insulators.—Taylor, Tunnicliffe & Co., Ltd.
Train lighting equipment.—J. Stone & Co., Ltd.
Telegraph ironwork.—Bullers, Ltd.
Telephones.—British L.M. Ericsson Manufacturing Co., Ltd.
Static transformers.—English Electric Co., Ltd.
Copper line wire.—Shropshire Iron Co., Ltd.

Hornsey.—Electricity Committee. Recommended:—
Circuit breakers (£240).—Park Royal Engineering Co., Ltd.

Liverpool.—Health Committee. Recommended:—
Two complete electrically-driven crude sewage pumping sets at the West Derby sewage farm (£1,374).—Drysdale & Co., Ltd.

Tramways Committee. Accepted:—
Structural steel and iron works for the new tramway works and car depôt.—Lambourne & Co., Ltd.

Lowestoft.—Electricity Committee. Accepted:—
2,300 yd. feeder cable (£2,348); 2,300 yd. pilot cable (£245).—Callender's Cable & Construction Co., Ltd.

Lewes.—Board of Guardians. Accepted:—
Extending electric light to all parts of the Institution.—E. L. Tappin and Son.

London.—London County Council.—Highways Committee. Accepted:—
1,000-kW rotary-converter, with switchgear and cables, for the Hammersmith sub-station.—British Thomson-Houston Co., Ltd.
Battery for electrically-driven tower wagon (£820).—Edison Accumulators, Ltd.
Works transformer for Greenwich power station (£7,550).—C. A. Parsons and Co., Ltd.

Southwark.—Electricity Committee. Recommended:—
Cable.—Macintosh Cable Co., Ltd., and British Insulated & Helsby Cables, Ltd.
2,000 ft. copper bar (11½d. per lb.).—British Insulated & Helsby Cables, Ltd.
Feeder pillar (£80).—J. S. Plumtree.

Poplar.—Electricity Committee. Recommended:—
Instrument equipment and steam flow meters for boilers and turbines (£1,175).—Electro-Flow Meter Co., Ltd.
Steam feed-water and drain systems for the generating station (£7,500).—International Combustion, Ltd.
Temperature indicator (£167).—Cambridge & Paul Instrument Co., Ltd.

Salford.—Electricity Committee. Accepted:—
Cable.—W. T. Glover & Co., Ltd. (£2,621); Western Electric Co., Ltd. (£850).
100 large electric cookers (£1,360).—General Electric Co., Ltd.
150 "Falco" small electric cookers (£1,912).—Hotpoint Electric Appliance Co., Ltd.

Forthcoming Events.

Commercial Motor Transport Exhibition.—October 29th to November 7th. At Olympia, London, W.

Electrical Trades Commercial Travellers' Association.—Friday, October 30th. At Elms Rooms, 15, Savoy Street, W.C.2. At 7 p.m. Lecture on "The Human Aspect of Salesmanship," by Mr. V. W. Dale.

Glasgow Corporation Electricity Department Engineering Society.—Monday, November 2nd. At the Welfare Hall, St. Andrew's Cross Works. At 7.45 p.m. Paper on "Protective Gear," by Mr. R. W. Biles.

Institute of Transport.—Monday, November 2nd. At the Institution of Electrical Engineers, Victoria Embankment, W.C. At 5.30 p.m. Annual general meeting. Paper on "One Hundred Years of Railway Development," by Mr. R. Bell.

Society of Engineers.—Monday, November 2nd. At Burlington House, Piccadilly, W. At 5.30 p.m. Paper on "The Influence of Aggregates on the Strength and Properties of Concrete," by Mr. G. O. Case.

Institution of the Rubber Industry.—Monday, November 2nd. At the Engineers' Club, Coventry Street, W. At 8 p.m. Paper on "The Plasticity of Unvulcanised Rubber," by Mr. R. W. Griffiths.

Roentgen Society.—Tuesday, November 3rd. At 32, Welbeck Street, W. At 8.15 p.m. Presidential address, "Atoms and X-rays," by Mr. F. W. Aston, F.R.S.

Electrical Society of Glasgow.—Tuesday, November 3rd. At Glasgow. Lecture on "The Impetus of Electrical Marketing," by Mr. V. W. Dale.

Institution of Civil Engineers.—Tuesday, November 3rd. At the Institution, Great George Street, S.W. At 6 p.m. Presidential address by Sir W. H. Ellis, and presentation of medals awarded by the Council.

National Association of Supervising Electricians.—Tuesday, November 3rd. At 39, Victoria Street, S.W. At 7.15 p.m. Lecture on "Automatic Telephones," by Mr. H. H. Harrison.

Electrical Trades Benevolent Institution.—Wednesday, November 4th. At the Trocadero Restaurant. At 7.30 p.m. Annual festival.

Royal Society of Arts.—Wednesday, November 4th. At John Street, Adelphi, W.C. At 8.30 p.m. Inaugural address by the Chairman of the Council, Sir H. Holland, F.R.S., on "The Organisation of Scientific Research Throughout the Empire."

Edinburgh Electrical Society.—Wednesday, November 4th. At the Royal Society of Arts, 117, George Street. At 8 p.m. Paper on "Automatic Telephony," by Mr. W. J. H. Piper.

Institution of Mining Engineers.—Wednesday, November 4th. At the Institution of Mechanical Engineers, Storey's Gate, S.W. At 11 a.m. Annual general meeting.

Institution of Heating and Ventilating Engineers.—Wednesday, November 4th. At Caxton Hall, Westminster, S.W. At 7 p.m. Paper on "The Modern Development of Combustion Recording," by Mr. J. J. Lassen.

Institution of Electrical Engineers.—Thursday, November 5th. At the Institution, Victoria Embankment, W.C. At 6 p.m. Paper on "Dielectric Problems in High-Voltage Cables," by Mr. P. Dunsheath.

(Wireless Section).—Wednesday, November 4th. At the Institution, Victoria Embankment, W.C. At 6 p.m. Inaugural address by the Chairman, Major B. Binyon.

(Mersey and North Wales (Liverpool) Centre).—Monday, November 2nd. At the University, Liverpool. At 7 p.m. Address by the Chairman, Mr. A. E. Malpas.

(North-Western Centre).—Tuesday, November 3rd. At the Engineers' Club, Manchester. At 7 p.m. Address by the Chairman, Mr. A. G. Ellis.

(Western Centre).—Monday, November 2nd. At the Museum Lecture Theatre, Bristol. At 6 p.m. Lecture on "Domestic Electrification," by Mr. J. W. Beauchamp.

Electrical Power Engineers' Association.—Friday, November 6th. At the Institution of Electrical Engineers, Victoria Embankment, W.C. At 7 p.m. Lecture on "Electrical Faults in Power Plant and their Location," by Mr. G. M. S. Sichel.

Institution of Mechanical Engineers.—Friday, November 6th. At the Institution, Storey's Gate, S.W. At 6 p.m. Thomas Hawksley Lecture, "Some Railway Notes, Old and New," by Sir John A. F. Aspinall.

Junior Institution of Engineers.—Friday, November 6th. At 39, Victoria Street, S.W. At 7.30 p.m. Lecturette, "Flow Meters," by Mr. W. H. Simmons.

Faraday House Old Students' Association.—Friday, November 6th. At the Piccadilly Hotel. Annual dinner.

The "Electrical Review" Service Department.

Inquiries must be accompanied by a stamped addressed envelope.

We should be glad to learn the names of makers or suppliers of:—

Belata small single pole switches.
Floden electric curling tongs.

Notes.

The Electrical Trades Benevolent Institution.—Annual Festival Dinner.—On Wednesday next, November 4th, the Festival Dinner of the E.T.B.I. will be held at the Trocadero, London. There is still time to obtain tickets for this function, and thereby to benefit not only oneself, but also the protégés of the admirable Institution by which it is organised. We hope that our readers will take advantage of the opportunity to give it practical support—or, if they cannot attend in person, that they will demonstrate their sympathy with its objects in the usual manner observed among men of goodwill.

The Rt. Hon. F. G. Kellaway will be the principal guest. Tickets can be obtained from Mr. F. B. O. Hawes, 98, Grosvenor Road, S.W.

Late Legal.—British Insulated & Helsby Cables, Ltd., Pension Fund.—Arguments were heard recently in the House of Lords by the Lord Chancellor, and Lords Atkinson, Buckmaster, Carson and Blanesburgh, in the case British Insulated and Helsby Cables, Ltd., *v.* J. Atherton (Inspector of Taxes), raising a novel income tax point. For the year ended April, 1918, the company was assessed to income tax in the sum of £250,000, against which it appealed on the ground that there should be a deduction of £31,784, in respect of a contribution to a pension fund for the benefit of its clerical and technical staff. The appeal was allowed by the Special Commissioners, and the assessment reduced to that extent, but a Special Case was stated and Mr. Justice Rowlatt upheld the decision. The Court of Appeal, however, reversed the finding and the company appealed to the House of Lords. Sir John Simon, K.C., speaking on behalf of the company, said that the absence of a pension fund had resulted in the company's losing some of its best men, and it was a matter of business that it should provide such a fund in order to keep its men. The sum was, in consequence, money wholly and exclusively expended for the purpose of its trade and the deduction was admissible. Addressing the House on behalf of the Crown, Sir Douglas Hogg, K.C. (the Attorney-General) maintained that as the sum was a lump one and not spread over years, the deduction was not admissible. Their Lordships reserved judgment.

WORKMEN'S COMPENSATION AWARD.—An electrician, James Henry Cook, of Wilson Street, Thornaby, applied at the Stockton County Court on October 20th for compensation in respect of injuries received while working for Messrs. Thomas Allen and Co., Iron Lea Foundry, Thornaby.

Mr. T. Richardson, for plaintiff, explained that in July his client was working on a crane, when the ladder on which he stood slipped, and in endeavouring to save himself Cook came into contact with a live electric wire. He held this wire until a man, hearing his cries, switched off the current. Applicant fell from the wire to the ground, a distance of 18 ft., and as a result of the mishap two fingers of the left hand had to be amputated. His ankle and shoulder were injured by the fall, his shoulder permanently. Applicant earned £3 a week, and he claimed 30s. a week compensation. Plaintiff admitted in cross-examination that it was his duty to cut off the current before he did any such work, but on this occasion he forgot to do so.

Medical evidence was given to the effect that applicant's shoulder was permanently disabled.

For the defence it was contended that applicant had infringed the regulations in failing to cut off the current, but Judge Moore held that respondents had not established serious and wilful misconduct; the applicant had merely been guilty of inadvertence. He awarded the applicant 30s. a week from the date of the accident.

Engineers' Club Dinner.—The second annual banquet of the Engineers' Club (London) was held at the Savoy Hotel on October 23rd, the president, Sir J. W. Isherwood, Bt., being in the chair. It was a largely attended and very successful function; amongst the many distinguished guests was the Chancellor of the Exchequer, who was the guest of the evening, and whose speech was broadcast from Daventry.

Following the loyal toast, that of "Our Guests" was proposed by the president, and in responding Mr. Winston S. Churchill, P.C., M.P., said that they would be wise in revolting against the prevailing weak, foolish and injurious mood of panic-stricken pessimism. Things were not getting worse and there was even a probability that they might get better.

The British share of the oversea trade of the world had not diminished since the war. It was true that there was a reduced amount of world oversea trade, but of that reduced trade this country possessed a slightly larger proportion than it did before the war. In 450 typical businesses there had been an improvement of 11 per cent. in profit-making this year as compared with 1923. There had been a considerable diminution in the cost of living, and the yield of revenue fully bore out the expectations upon which the Budget had been framed.

The consuming power of the people had not only been maintained, but in the case of many commodities it had been increased. The savings of the people in National Saving Certificates had increased by £7,000,000 in the present year. The latest estimate which had been laid before him showed that so far from getting poorer, or living on our capital, we were saving capital by hundreds of millions a year. Far fewer days had been lost by strikes this year than last year. Leaving out the exceptional conditions of the coal trade, employment in the general trade of the country had increased by 150,000. It was true that the population was increasing. The number of people who had reached the employable age last year was 100,000. Still there were 250,000 more people at work in the general trade of the country than there were a year ago.

The remission of taxation which was given by the Budget would cost more in the second year than in the first. In consequence it would be necessary either to reduce expenditure, or that there should be some quite exceptional trade expansion, if the Budget of 1926 was to be accurately and honestly balanced. As they could not count on an exceptional trade expansion, let them make sure of a reduction in expenditure, for which conditions were favourable.

Proposing "Success to British Engineering," Sir Philip A. M. Nash remarked, *inter alia*, that they could not live on tradition alone. If they faced the facts, they would find that conditions were not becoming worse; they should dwell on the future, not the past. British engineers wanted opportunities, and the one which showed most promise was the development of the Empire. They should make more use of the brains and achievements of pure science workers. Regarding national development of electricity, it was insufficient to know that the Government was considering the subject; what was required was a pronouncement or guidance as to policy, and now was the time for it.

Sir T. Harris Spencer and Air Chief Marshal Sir Hugh M. Trenchard responded, after which "The Engineers' Club" was toasted by Mr. Winston Churchill, the president replying. A selection of music by the band of H.M. Scots Guards added to the enjoyment of the evening.

London Traffic Inquiry. — An inquiry was opened last week at the Guildhall, Westminster, by a sub-committee of the London and Home Counties Advisory Council, into the traffic facilities in North London. The inquiry was adjourned until November 2nd.

Local Societies.—There was a record attendance of members at a meeting of the Glasgow Corporation Electricity Department Engineering Society held recently to hear the address of the President, Mr. R. B. Mitchell, at the opening of the Session, 1925-1926. The President reviewed the work of the department during the past year and outlined the prospects for the current year and for future years. The society is in a flourishing condition and an interesting syllabus of meetings has been arranged for the current session, including a visit to the hydro-electric works at Stonebyres, Falls of Clyde. At the next meeting on November 2nd, a paper on "Protective Gear" is to be delivered by Mr. R. W. Biles, D.F.H., of Messrs. A. Reyrolle & Co., Ltd.

NOTTINGHAM SOCIETY OF ENGINEERS.—The annual general meeting was held on October 12th, under the presidency of Prof. Bulleid, O.B.E., at the Victoria Station Hotel. Mr. E. G. Phillips was elected president for the ensuing year, and addressed the members on the subject: "What is an Engineer?" He quoted, as exactly expressing all that he believed to be essential to an engineer, the qualities specified by Mr. W. Roland Needham in his article on "The Designer and Initiative" (ELECTRICAL REVIEW, October 2nd, 1925, p. 532), and pointed out that the engineer had played an important part in developing life as now enjoyed, and was probably the greatest civilising force in existence.

The *Proceedings* of the Society are now printed, through the generous assistance of Ald. Sir John Turney, J.P.

Fatalities.—James Carter, labourer, of Oak Street, Oswaldtwistle, was killed recently at the Broad Oak Print Works, Accrington. An inquest was held on October 23rd, at Accrington. William Nuttall, an electrician employed at the works, stated that on October 19th they were brazing a portable electric light standard in a hot-air chamber in the cleaning department of the works. Carter was his labourer. The light stand was made of half-inch steel tubing and was 10 ft. high, through which ran two electric lighting wires carrying 250-volt alternating current, which lit five electric lamps attached to the tubing and 2 ft. apart. That job was completed, but two days later they were engaged connecting ten electric lighting mains in the distribution box in the cleaning department. Carter was labouring for witness, and he sent him into a room to put the fuses into the main feeder box in order to put the supply on at the place where they were working. Witness went away, and, when he returned ten minutes later, he noticed that the lights in the cleaning department and the hot-air chamber were on. He also noticed that the portable light stand in the hot air chamber was moving. He opened the chamber door, and found Carter lying on the ground, with his neck against the bottom of the light stand. He then ran to the distribution box and withdrew the fuses. Artificial respiration was tried for a quarter of an hour. A medical witness said that the cause of death was suffocation, but he could not say whether it was caused by electric shock, but it probably was. Mr. Topham said that he made tests in company with the electrical engineer, and found conditions which justified him in thinking that Carter might have had an electric shock. The jury found that Carter had died from an "electric shock, or accidental death."

A verdict of "Death due to electrocution," was returned on October 23rd at an inquest on Fred Ackroyd (36), of Oldham, labourer at Asa Lees & Co., textile machinists. After starting an electric motor he received a shock and died immediately. This, it was stated, was the first accident that had occurred at the works, where there were nearly 100 similar motors. It is presumed that the man's clothes acted as a conductor, as he had been out in the rain.

The Proposed Institute of Wireless Engineers.—The meeting in connection with the proposed Institute will be held at the Hotel Russell, Russell Square, London, to-morrow, October 31st. The chair is to be taken at 2.30 p.m. Tea will be served at 5 p.m., and the meeting will be continued till 7 p.m. if necessary. All interested persons are invited to be present.

Mining Electrical Engineers.—SCOTLAND BRANCH.—Mr. D. Landale Frew, in his presidential address to the West of Scotland Branch of the Association of Mining Electrical Engineers at Glasgow, dealt with the developments in the use of machinery and electricity in coal mining in Scotland. He believed there was still much for the Association to do in the matter of the practical training of the men who handled the machines. The Government had an opportunity of forming training centres for such men, which would be much to the advantage of the coal industry, both to masters and men, in maintaining output and minimising breakdowns. The Association had for many years been considering the matter, but had been up against the difficulty of providing funds for equipping and running such centres.

Appointments Vacant.—Assistant telegraph engineers (probationary), for the Government of the Federated Malay States; switchboard attendant, for the Nuneaton Corporation electricity works; junior charge engineer, for the Derby County Borough electricity department; scientific instrument maker, for the Battersea Polytechnic; cable jointer, for the Middleton Corporation electricity department; combustion engineer, for the Southampton County Borough electricity works; plumber-jointer, for the Southend-on-Sea electricity department; meter repairer, for the Lancaster Corporation electricity works. (See our advertisement pages to-day.)

Finsbury Technical College.—The fourteenth annual dinner of the Old Students' Association of the College will be held at the Engineers' Club, Coventry Street, London, on Saturday, November 14th, at 7 p.m. Ladies are invited. Tickets are 6s. 6d. each, exclusive of wines, and may be obtained from Mr. R. O. Grant, hon. secretary, 70a, Basinghall Street, E.C.2.

The Batti-Wallahs' Society.—On Wednesday last week, the Batti-Wallahs held a re-union luncheon, at which Col. R. E. Crompton, C.B., was the principal guest. Mr. Pooley, presiding, read a letter from Sir Hugo Hirst, regretting his inability to be present owing to indisposition.

Col. Crompton, invited by the president to address the gathering, recalled his first acquaintance with batti-wallahs when he was on the staff of the Commander-in-chief in India, and, after other intimate reminiscences, extolled the merits of men who were always trying to make others happy—a quality which in his long experience he had found more fully developed amongst electrical engineers than in any other class. He expressed a strong desire that electrical men should become better friends with those concerned in the gas industry.

Proposing a vote of thanks to Col. Crompton, Mr. J. W. Beauchamp said that as time went on they would find some means of co-operating with the gas people, but he would regard with distrust any attempt to fix a line of demarcation between their respective spheres. Electricity and gas had both benefited enormously by active competition, to the advantage of the public.

At the suggestion of the president, Mr. E. S. Barralet made a brief appeal for support to the Electrical Trades Benevolent Institution, and a collection realised over £7.

Institution Notes.

Institution of Electrical Engineers.—The arrangements for the first part of the session 1925-26 include the following items:—

Ordinary Meetings of the Institution.

November 5th.—Mr. P. Dunsheath, O.B.E., M.A., B.Sc. "Dielectric Problems in High-Voltage Cables."
November 19th.—Mr. T. Carter. "The Engineer: His Due and His Duty in Life."
December 3rd.—Prof. S. P. Smith, D.Sc. "An All-Electric House."
December 17th.—Mr. C. E. Webb, B.Sc.(Eng.). "The Power Losses in Magnetic Sheet Material at High Flux Densities."
January 7th, 1926.—Capt. P. P. Eckersley. "Past, Present, and Future Developments in Wireless Telephony."
February 11th.—Annual dinner.

Wireless Section Meetings.

November 4th.—Major B. Binyon, O.B.E., M.A. (chairman of the Wireless Section). Inaugural address.
December 2nd.—Mr. H. A. Thomas, M.Sc. "The Performance of Amplifiers."
January 6th, 1926.—Lt.-Col. K. E. Edgeworth, D.S.O., M.C. "Frequency Variations in Thermionic Generators."

Informal Meetings.

November 9th.—Discussion on "Modern Developments of Telephone Cables." (Opened by Mr. E. S. Ritter.)
November 23rd.—Discussion on "The Testing of Large Electric Plant." (Opened by Mr. E. E. Tasker.)
December 7th.—Discussion on "Design and Performance of Protective Relays." (Opened by Mr. C. L. Lipman.)
December 11th, 1926.—Discussion on "The Electrical Installation in the Rockefeller Building, University College." (Opened by Mr. W. C. Clinton, B.Sc.).

Opening Meeting.—At the first meeting of the 1925-26 session on October 22nd, Mr. W. B. Woodhouse, retiring president, presented the premiums awarded by the Council for papers read last session before the Institution and its Wireless Section. After the presentation of the scholarships awarded by the Institution, Mr. R. A. Chattock, the new president, took the chair, and called upon Mr. Roger T. Smith to propose a vote of thanks to the retiring president; it was seconded by Dr. A. Russell and passed with enthusiasm. The president then delivered his inaugural address, an abstract of which is commenced elsewhere in this issue, and, following a vote of thanks proposed by Mr. S. P. Sparks and seconded by Dr. W. Thornton, the meeting, which was well attended, terminated at 7 o'clock.

Royal Society of Arts.—The 172nd session will be opened on Wednesday, November 4th, at 8.30 p.m., when the inaugural address will be delivered by Sir Thomas H. Holland, K.C.S.I., K.C.I.E., F.R.S., chairman of the Council, on "The Organisation of Scientific Research Throughout the Empire." A course of three lectures under the Cantor Trust will be delivered during the session by Dr. R. Lessing on "Coal Ash and Clean Coal." At the meetings after Christmas papers will be read, including "The Propagation of Electric Waves," by Mr. J. E. Taylor; "Problems in Paint and Varnish Technology," by Dr. H. Houlston Morgan; and "Domestic Heating," by Dr. Mary Fishenden. Courses of lectures will also be delivered by Dr. G. W. C. Kaye on "The Production and Measurement of High Vacua," and by Mr. W. F. Higgins on "Thermometry."

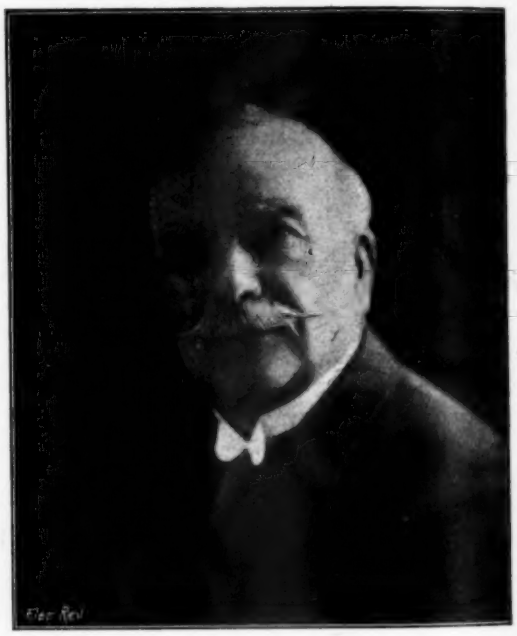
Our Personal Column.

(Electrical men are invited to enable us to keep readers of the "Electrical Review" posted concerning their movements.)

Mr. Charles V. Watson has left the service of the Walsall Corporation Electric Supply Department, to take up an appointment as junior mains assistant with the Yarmouth Corporation Electricity Department. Mr. Watson received several presents from his Walsall colleagues.

Last week the Glasgow Corporation approved the appointment by the Superintendent of Lighting, of Mr. Edward Stewart, head of his technical staff, to be assistant inspector in the place of Mr. Milner, who served the municipality for half a century. Mr. Stewart graduated M.A. and B.Sc. at Glasgow University, and before entering the Lighting Department was science master at Airdrie Academy.

Mr. C. Newton Russell, Assoc.M.I.C.E., M.I.E.E., who is shortly retiring from the service of the Shoreditch Borough Council, has served with that body as electrical engineer for nearly 29 years. He served his apprenticeship at Stockton-on-Tees, afterwards taking up the study of electricity and visiting electrical works in the United States. He was for some time a student in the School of Telegraphy and Electrical Engineering, Hanover Square. In 1882 he joined the firm of W. T. Goolden & Co., and had charge of their section of the lighting of the Inventions and other exhibitions at South Kensington, also the carrying out of a large amount of important work on warships for the British Admiralty and the Indian Government. In 1887 he was appointed engineer to the Acton Hill Electrical Works, and five years later became manager to the London and Lancashire Electrical Co., Dalston. In 1896 he was appointed chief electrical engineer to the Vestry of St. Leonard's, Shoreditch (now the Metropolitan Borough of Shoreditch), his present position. Mr. Newton Russell has contributed several papers to various engineering societies on the subject of steam-raising by means of the burning of town's refuse, and he was awarded a Telford Premium by the Institution of Civil Engineers. While acting as electrical engineer to the Borough of Shoreditch, Mr. Newton Russell has been responsible for carrying out extensions of plant and mains to the value of over half-a-million sterling. A further extension of the Whiston Street electric power station has recently been sanctioned by the Electricity Commissioners, comprising the installation of a



Navana, Ltd. [*London.*

Mr. C. Newton Russell.

10,000-kW turbo-alternator, boiler, switchgear, &c., at an estimated cost of £70,000. For some years Mr. Newton Russell has acted as one of the representatives of the Incorporated Municipal Electrical Association on the British Engineering Standards' Association. During the war he took an active part in connection with the inception of the Metropolitan Munitions Committee, of which he was one of the earliest members, and was appointed by that body to act as district manager for the greater part of the eastern area of London; he served throughout the war in that capacity. Although Mr. Russell is retiring from an active part in the management of the Shoreditch undertaking, his services are being retained by the Council as consulting engineer in an advisory capacity for a period of one year, as stated in these pages last week. Mr. Newton Russell's successor is Mr. William Weekes, A.M.I.E.E., who has been chief assistant at Shoreditch for many years, and has been in the employ of the Council for about 28 years. Mr. Weekes has a thorough knowledge of the undertaking, and we wish him success in his new position.

Mr. Dean K. Chadbourne has been appointed general manager of the Westinghouse Electric International Company to succeed Mr. E. D. Kilburn, who was recently elected vice-president of the Westinghouse Electric & Manufacturing Company.

Mr. Leonard Johnson, traffic superintendent of the Birmingham Tramways, is in hospital suffering from a bullet wound received on Saturday morning. A tramway inspector named John Henry Cuttler has been arrested in connection with the affair.

Mr. C. L. Holman, manager since 1919 of the Stamford Electricity Works, has been appointed to a similar position at Frome, Somerset, where he will commence his duties next month

Mr. R. W. GREGORY, the new chairman of the North-Eastern Centre of the Institution of Electrical Engineers, whose portrait accompanies this note, is the head of Messrs. Merz and McLellan's electrical department. Mr. Gregory was born at North Cadbury, Somerset, in 1882, and was educated at Sexey's School, Bruton, and Finsbury Technical College. In 1901 he joined the Newcastle-upon-Tyne Electric Supply Company, and, under Mr. H. L. Risley, obtained experience on the construction and operation of the Neptune Bank and Carville power stations. Mr. Gregory joined the staff of Messrs. Merz & McLellan at the end of 1903, and, under Mr.

J. Bacon & Sons [*Newcastle-on-Tyne.*

Mr. R. W. Gregory.

Chairman of the North-Eastern Centre of the I.E.E.

Bernard Price, worked on the North-Eastern Railway electrification scheme, the construction of the Dunston power station, and the development of the 20,000-V distribution system on the North-East Coast. Later he became chief electrical draughtsman and switchgear engineer for his firm. During his long association with Messrs. Merz & McLellan, Mr. Gregory has worked on many important schemes, among them being railway electrifications in Argentina, Australia, South Africa, and India; the Barking power station of the County of London company; the Mersey Power Company's developments; and the electricity supply system of the North-East Coast Power Companies. Mr. Gregory has served on the British Engineering Standards Association sub-committee on oil break switches and switchgear, and the British Electrical and Allied Industries Research Association sub-committee on oil circuit breakers. His paper on "Sub-station Design with particular reference to Metal-Clad Switchgear" was read in Paris this summer at the International Conference on Extra-High-Pressure Systems. Mr. Gregory delivered his inaugural address on Monday last.

At a meeting of the Fleetwood District Council, on October 21st, a motion to rescind a resolution to raise the salary of the Council's electrical engineer in accordance with the recognised scale was defeated.

The Highways Committee of the London County Council recommends that Mr. T. E. THOMAS, development superintendent, be promoted to the position of traffic manager in the traffic branch of the tramways department, at a salary of £1,200, rising to £1,500 a year (based on pre-war conditions); that Mr. F. SCOTHORNE, traffic statistics assistant, be promoted to the position of development superintendent in the traffic branch of the tramways department at a salary of £500, rising to £800 a year (based on pre-war conditions); that Mr. E. A. WOOD, assistant superintendent of the central repair depôt, be promoted to the position of superintendent of the central repair depôt in the rolling stock branch of the tramways department, at a salary of £500, rising to £650 a year (based on pre-war conditions); that Mr. R. E. S. MACINTYRE, technical assistant (Grade 2) be promoted to the position of permanent-way engineer in the tramways department at a salary of £500, rising to £600 a year (based on pre-war conditions).

The silver wedding was celebrated on October 14th of Mr. and Mrs. L. B. CANTWELL. Mr. Cantwell is head of the firm of Messrs. Cantwell & Hedger, electrical engineers, of High Street, Broadstairs.

M. MINIEUR, director of the Tunis Electricity & Gas Co., has lately been appointed a Chevalier of the Légion d'Honneur.

We reproduce herewith a portrait of Mr. A. E. MALPAS, the new chairman of the Mersey and North Wales (Liverpool) Centre of the Institution of Electrical Engineers, who is to deliver his address on Monday next. Mr. Malpas was born in London in 1871. From 1885 to 1891 he was an apprentice in marine engineering at the Portsmouth Dockyard, where he gained experience in the various departments. While an apprentice he gained a Whitworth Exhibition and proceeded to Victoria University, Manchester. In 1892 he gained a National Scholarship, which took him to the Royal College of Science, London. Mr. Malpas gained a Whitworth Scholarship in 1893, which enabled him to attend lectures in electrical engineering under Prof. Ayrton, at the Central Technical College. Upon leaving college in 1894 he joined Messrs. Willans & Robinson, Ltd., as assistant in their Contract and Estimating Department. From 1897 to 1899 Mr. Malpas served as chief engineer and manager to Messrs. Calvert and Co., Manchester, and while with them carried out power and lighting installations in various parts of the country. His next post was with Messrs. Arthur Guinness, Sons and Co., Ltd., Dublin, who were spending over £100,000 on extensions to buildings and plant for the generating station. Having completed this work, Mr. Malpas went to the United Alkali Co., Ltd., as chief assistant to the superintending engineer, and in this capacity erected the first Kestner evaporator in England, for the concentration of caustic liquors in connection with a waste heat recovery scheme. He was also responsible for the construction and erecting of a battery of electric furnaces operated by gas-driven sets, aggregating 500 h.p. In 1903 he went to Spain as engineer to the Sociedad de Casificacion Industrial, to take charge of the building and operation of a 12,000-h.p. gas producer plant erected in Madrid for the public supply of electricity. This company subsequently undertook a hydro-electric development upon the river Tagus, installing turbines with a capacity of 15,000 kVA. While in Spain, Mr. Malpas rendered assistance to the Electrolytic Chemical Co., of Aboño, Asturias, and he was subsequently with other chemical companies in Spain. He was recalled from Spain in 1915 to take up the position of manager of the Ammonia Soda Co., Ltd., with which he had previously served. When these works were taken over by Messrs. Brunner, Mond & Co., Ltd., Mr. Malpas trans-

Lafayette [*Manchester.*

Mr. A. E. Malpas.

Chairman of the Mersey and North Wales (Liverpool) Centre of the I.E.E.

ferred to the United Alkali Co., Ltd., as manager of the Perchlorate Works, Flint, and in 1919 he was appointed chief engineer to the company. After about six years in this position he commenced to practise as a consulting engineer in Liverpool, remaining consulting engineer to the United Alkali Co. Mr. Malpas is a member of the Institutions of Electrical, Mechanical and Chemical Engineers.

We are asked to state that Mr. E. H. WOODHALL has resigned from the board of directors of Messrs. Woodhall and Partners, Ltd., Swansea, and is not now connected with the company.

Mr. Harold C. Rogers, who for many years represented the British Thomson-Houston Co., Ltd., on the South Coast, will represent the Stearn Electric Co., Ltd., in that district from November 1st.

Mr. R. C. Bullough, who was manager and engineer of the Colchester Corporation Tramways from their inception 21 years ago until his retirement recently, has been presented by the employés of the department with a gold albert.

Mr. William A. McGilvray has joined the staff of the British Ebonite Co., Ltd., and will represent it in the North of England.

Mr. H. J. Nisbett, who has been manager of the Torquay Tramways Company for many years, is retiring from that post in order to devote his whole attention to public work. He is at present engaged in a municipal contest in the Babbacombe ward.

Obituary.—Mr. J. Malone.—The death took place on October 16th of Mr. James Malone, of Barnstaple, where he had carried on business as an electrician for 20 years. He was 70 years of age.

Herr F. T. Horn.—The death recently occurred, at the age of 71 years, of Herr Friedrich T. Horn, founder of the Horn Tachometer and Electric Measuring Instrument Works, of Grosszschocher, Leipzig.

Herr M. Hahn.—The death is reported from Vienna of Herr Max Hahn, general director of the Austrian Berliner Telephone Works, of that city.

Wills.—The late Mr. A. E. Mills, M.A., M.I.E.E., Fellow of the Physical Society, of North Finchley, consulting engineer, left £10,767 gross and £7,692 net personalty.

The late Mr. E. P. Simpson, a director of Worthington Simpson, Ltd., left £20,579 gross and £17,769 net personalty.

New Companies Registered.

British Rolled Steel Pole Co., Ltd. (209,065).—Private company. Registered October 17th. Capital, £10,000 in £1 shares (6,000 8 per cent. preferred ordinary and 4,000 deferred ordinary). Objects: To acquire a certain patent relating to improvements in the construction of telegraph, telephone and electrical service poles and masts and for other purposes. The first directors are:—F. L. Baldwin, Bentley Lodge, Banstead, Surrey; F. L. Broughton, Fieldhead, Hempstead, Gloucester; J. Payton, The Grange, Warwick Road, Solihull, Warwickshire; H. Kershaw Walker, Sandringham House, Sutton, Surrey. Qualification, 100 preferred ordinary shares. Remuneration (except managing director, if any) as fixed by the company. Secretary: A. F. Smith. Solicitors: Markby, Stewart & Wadesons, 5, Bishopsgate, E.C.2. Registered office: 3, Throgmorton Avenue, E.C.2.

Valco, Ltd. (209,073).—Private company. Registered October 17th. Capital, £100 in £1 shares. Objects: To carry on the business of electrical, mechanical, wireless and general engineers, inventors, designers, manufacturers and repairers of, agents for, and dealers in lamps, valves, batteries, accumulators, receivers, amplifiers, and other electrical goods, accessories and materials, &c. The subscribers (each with one share) are:—P. V. Castell-Evans, Carn Dochun, Elthorne Heights, W.7, engineer; J. E. Oliver, 18, Milner Road, Merton Park, S.W.19, sales manager. The first directors are to be appointed by the subscribers. Secretary: J. E. Oliver.

Barclay, Young & Co., Ltd. (209,088).—Private company. Registered October 19th. Capital, £250 in 225 5 per cent. non-cumulative preference shares of £1 and 1,000 deferred shares of 6d. each. Objects: To carry on the business of electrical engineers and contractors; to promote companies for the purchase of rubber, oil and timber properties, mineral concessions or other properties; to carry on newspapers, to act as financiers, manufacturers, shipowners, carriers by land or sea; to construct and maintain roads, works, buildings and conveniences, &c. The subscribers (each with one preference share) are:—A. M. Kinnear, 65, Dalmeny Avenue, Norbury, S.W.16, engineer; W. R. Patterson, 12, Meyrick Road, Clapham Junction, S.W., clerk. The first directors are to be appointed by the subscribers. Secretary: S. E. Young. Registered office: 115, Hammersmith Road, W.14.

A. E. Pierson & Son, Ltd. (209,052).—Private company. Registered October 17th. Capital, £2,000 in £1 shares. Objects: To acquire the business of a lamp shade manufacturer and ornamental wire worker carried on by A. E. Pierson at 414, Edgware Road, W., as "A. E. Pierson and Son." The first directors are:—A. E. Pierson, Sun Villa, Northolt Junction, lamp shade manufacturer (permanent governing director); Harriet L. Pierson, Sun Villa, Northolt Junction. Qualification, 1 share. Solicitors: Greville and Averill, 35, Baker Street, Portman Square, W. Registered office: 414, Edgware Road, W.

Hygienic Telephone Attachment Co., Ltd. (209,148).—Private company. Registered October 21st. Capital, £2,400 in £1 shares. Objects: To adopt an agreement with E. A. Jones and to carry on business as manufacturers and traders of the Jones hygienic telephone attachment, &c. In a winding-up the patent rights shall revert to E. A. Jones except in such countries where such rights have been disposed of. The directors are:—E. A. Hoaband, 52, Rupert Street, W.1; W. D'Oyley Rochfort, 52, Rupert Street, W.1; L. R. Warrens, 12, St. Simon's Avenue, Putney, S.W.15; and E. A. Jones, 50, West End Lane, Hampstead, N.W. Registered office: 52, Rupert Street, W.1.

Truescrews, Ltd. (209,134).—Private company. Registered October 20th. Capital, £500 in £1 shares. Objects: To carry on the business of factors, manufacturers, wholesalers, importers and exporters of and dealers in metal screws, nuts, bolts, washers, terminals and the like, and all kinds of goods appertaining to the wireless, electrical and engineering trades and industries, &c. The first directors are:—H. F. Maslin, 1, St. Andrew's Road, Stamford Hill, N.16, sales manager; E. R. Gilbert, The Cottage, Greenford Station, South Harrow, advertising agent. No qualification required. Solicitors: Denton, Hall and Burgin, 3, Gray's Inn Place, W.C.1. Registered office: 58, Ludgate Hill, E.C.4.

Rectalogy, Ltd. (209,129).—Private company. Registered October 20th. Capital, £500 in £1 shares. Objects: To carry on the business of dealers in and importers and exporters of all kinds of metals and alloys, manufacturers of and dealers in accessories and fittings of every description, and all kinds of goods in connection with wireless, electrical and engineering trades and industries, &c. The first directors are:—W. S. Worthington, Little Pipers, Clay Hill, Enfield, manufacturer (chairman and managing director); E. R. Gilbert, The Cottage, Greenford Station, Middlesex, advertising agent. No qualification required. Solicitors: Denton, Hall and Burgin, 3, Gray's Inn Place, W.C.1. Registered office: 58, Ludgate Hill, E.C.4.

T. D. Morison, Ltd. (209,132).—Private company. Registered October 20th. Capital, £1,000 in £1 shares. Objects: To carry on the business of electrical and mechanical engineers, toolmakers, metal workers, smiths, woodworkers, metallurgists, and chemists, manufacturers and repairers of and dealers in motor cars, motor cycles and other vehicles, manufacturers and treaters of and dealers in textile fabrics, leather goods, drugs, chemicals, &c. The subscribers (each with one share) are:—F. P. Winterbotham and H. K. Lee, both of 10 and 12, Bishopsgate, E.C.2. T. D. Morison is the first director. Solicitors: Waterhouse & Co., 10 and 12, Bishopsgate, E.C.2.

Industrial Gases, Ltd. (209,175).—Private company. Registered October 22nd. Capital, £10,000 in £1 shares. Objects:—To acquire the benefit of existing agreements, patents, and rights in the British Empire or elsewhere in respect of industrial gases, electro-chemical, and other electrical products or apparatus therefor, to carry on the business of manufacturers and sellers and buyers of industrial gases, carbide of calcium, and other similar products or products arising therefrom, electro-chemical products and apparatus, electrical and other plant, &c. The first directors are:—C. H. Bingham, 2, Kingswood Road, S.E.19; C. H. Bingham, junr., 2, Kingswood Road, S.E.19 (directors of Abercar, Ltd., Acetaar, Ltd., Alliance Calcar Co., Ltd., Bristol Carbide Co., Ltd., Newcastle Carbide Co., Ltd., Newcalcar, Ltd., Chas. Bingham & Co., Ltd., Alliance Carbide Co., Ltd., and Albion Products (1921), Ltd.). No qualification required for the first directors. Remuneration as fixed by the company. Secretary: A. Baker. Registered office: 34, Victoria Street, S.W.1.

Electricity Distribution of North Wales and District, Ltd. (209,196).—Registered as a "public" company on October 23rd, with a nominal capital of £205,500 in 200,000 preference shares of £1 and 110,000 ordinary shares of 1s. each. The preference shares are entitled to a cumulative preferential dividend of 6 per cent. and the right in each year to the extent of, but not more than, a further 4 per cent. per annum to share equally with the ordinary shares in the profits of the company after paying the holders the said preferential dividend. The objects are:—To carry on in England and elsewhere the business of an electric light and power company in all its branches, and for that purpose to apply to and obtain from Parliament or the Board of Trade or any other governing or competent authority any Acts of Parliament of the United Kingdom, or Special or Provisional Orders, to purchase or otherwise acquire, or to enter into and carry into effect any agreements for working and carrying on any undertaking authorised by any Act of Parliament or Provisional Order obtained by any local authority, company, body, or person, and to construct, lay down, erect and fix, and carry out all necessary stations for generating electrical energy, works, plant, machinery, and sub-stations, cables, wires, lines, pipes, mains, accumulators, lamps, and apparatus for the distribution and supply of electricity for all purposes, to apply for and obtain from Parliament, the Board of Trade, Minister of Transport, and the Light Railway Commissioners or other Government authority any Act of Parliament of the United Kingdom Tramway Order or Light Railway Order, and to carry the same into effect; to carry on the business of engineers, manufacturers of and dealers in apparatus, contractors for the construction and equipment of any works authorised by any Provisional Tramway or Light Railway Orders, whether electrical or other mechanical power, &c. The subscribers (each with one share) are:—H. Braten, 88, Dollis Hill Lane, Cricklewood, N.W.2, clerk; C. Osborne, 36, Beeklands Road, Streatham, S.W.17, clerk; and five other clerks. The minimum cash subscription is 7 shares. The directors may raise a loan not exceeding £100,000, being the loan which it is intended should be guaranteed by His Majesty's Treasury in pursuance of the Trade Facilities Acts, 1921-25. The directors may also from time to time raise or borrow any moneys for the purposes of the company within specified limitations.

The Treasury shall be represented on the board by one director, who shall not be removable without the sanction of the Treasury during the currency of the above loan nor prior to the raising thereof. The Investment Registry, Ltd., the Power Development Co., Ltd., and the Gwynedd Trust, Ltd., may each appoint one director, whose remuneration shall not be less than the highest remuneration paid to any other director other than the Treasury director, or chairman, and no director appointed by those companies shall be subject to retirement nor be required to hold any qualification. The first directors are not named. Qualification of other directors, £100. Remuneration (except Treasury director, chairman, and managing directors), £150 each per annum, free of income tax. Solicitors: Last, Riches and Fitton, 17, Sackville Street, W.1.

Measurement (Australia), Ltd. (209,228).—Private company. Registered October 24th. Capital, £25,000 in £1 shares. Objects:—To acquire from Measurement, Ltd., the Australian branch of the business, and to carry on in Australia or elsewhere the business of manufacturers, vendors and licensees of meters, machinery, and other apparatus for measuring, indicating, and recording the volume or flow of water and other liquids and electricity, or the strength and amount thereof, &c. The directors are:—Sir Henry Cowan (chairman), address not stated; F. R. Smith, "The Garth," Limpsfield Common, Surrey, gas engineer; F. Thorp, address not stated; and E. A. MacLeod, 16a, Carlton Road, Putney, S.W., engineer. So long as Measurement, Ltd., or its nominees hold a majority of the total issued share capital, the directors shall be nominated by it. Solicitors: Rutherford & Co., 48, Cannon Street, E.C.

Official Returns of Electrical Companies.

A. O. Reflector Co., Ltd.—T. A. Evans, of 2 and 3, Salisbury Court, Fleet Street, E.C.4, C.A., was appointed receiver on October 8th, under powers contained in instrument dated January 16th, 1925.

Radio (Hove), Ltd.—Debenture dated October 2nd, 1925, to secure £300 constituting a floating charge on the company's undertaking and property, including uncalled capital and specific charge on lathes, drills, electric motor, &c. Holder: A. A. Gibson, 23/5, Billiter Street, E.C.

Halifax and Bermudas Cable Co., Ltd. (28,972).—Return dated October 8th, 1925. Capital, £50,000 in £5 shares. All shares taken up. £50,000 considered as paid. Mortgages and charges, nil.

Torquay Tramways Co., Ltd.—Satisfaction to the extent of £1,300 on September 30th, 1925, of charge dated March 8th, 1911, securing £60,000.

Musselburgh and District Electric Light and Traction Co., Ltd.—Satisfaction to the extent of £1,500 on September 30th, 1925, of charges dated November 13th, 1905, and May 11th, 1909, securing £90,000.

Norwood Wholesale Fittings Supply Co., Ltd.—C. Austin, of 29, Brunswick Mansions, Aldgate, E.C., ceased to act as receiver or manager on March 31st, 1925. (Notice filed October 17th.)

Adams Brothers (Longton, 1925), Ltd.—R. E. Clark, of 17, Albion Street, Hanley, was appointed receiver and manager on October 13th, under powers contained in debenture dated May 5th, 1925.

Buss, Webb & Son, Ltd.—Mortgage on land with messuages thereon in Foxhall Road, Ipswich, dated September 30th, 1925, to secure all moneys due or to become due from the company to Lloyd's Bank, Ltd., not exceeding £2,500.

Eclat Electric Manufacturing Co., Ltd.—W. W. B. Jackson, of 65-66, Chancery Lane, W.C.2, ceased to act as receiver or manager on April 6th, 1925. (Notice filed October 16th.)

Todman, Ryall & Co., Ltd.—Issue on October 7th, 1925, of £3,000 debentures, part of a series already registered.

City Notes.

Reports and Meetings of Electrical Companies; Dividend Results, &c.

Lisbon Electric Tramways, Ltd. The directors' report for the year ended December 31st, 1924, states that there was a net profit of £80,397 after deducting interest and amortisation on the debentures of the Cia. Carris de Ferro de Lisboa, and on the company's own debentures, and the payment of London expenses. To this sum is added £25,066 brought forward, making £105,463. Of this amount £32,000 is transferred to depreciation account, £63,833 is set aside for the payment of arrears of preference dividends, and the balance (£9,630) is carried forward. There was a fall in the number of passengers carried during the year from 89,566,215 to 83,782,431. Higher wages increased the expenses, but this rise was more than met by the improvement in the traffic revenue. The payment of the cumulative preference dividend has been brought up to December 31st, 1919.

Italian Companies. The *Società Piedmontese di Elettriche*, of Turin, is increasing its capital to 200 million lire with the object of acquiring a 70 per cent. interest in the Società Telefonica Interregionale Piedmontese. The title of the first-named concern is also being altered to the Società Industrie Elettro-telefoniche "S.I.E.T."

The *Società Italiana dei Servizi Radio-telegraphici e Radio-telefonici*, of Rome, has lately changed its title to the *Società Italiana Marconi*.

French Companies. The report of the *Société de la Maison Breguet*, of Paris, shows a net profit of 1,971,932 fr. for the financial year 1924-25, as compared with 2,172,453 fr. in the preceding year. The dividend on the old shares is being reduced from 60 to 50 fr.

Herbert Morris, Ltd.—The profit for the past year, after allowing for income tax, was £71,150. To this are added £30,224 brought forward and £8,936 from investments, &c., making £110,310. It is proposed to pay a further dividend on the ordinary shares, making 10 per cent., free of tax, for the year, to capitalise £6,225, to transfer £10,000 to reserve, and to carry forward £33,141. The meeting is to be held to-day (Friday) at Loughborough.

North Wales Power Co., Ltd.—The report for 1924 records a profit of £40,477, and the available balance, after deducting debenture interest, &c., and adding £2,686 brought forward, is £20,205. A dividend of 8 per cent., less tax, is recommended on the cumulative participating preference shares, leaving £3,219 to be carried forward.

Electrical Distribution of Yorkshire, Ltd.—The company has posted letters offering 250,000 ordinary shares to the shareholders at 26s. per share. The system of the company has been greatly extended, as a statement printed in our advertisement pages to-day indicates. At a meeting held a short time ago it was resolved to increase the capital of the company from £250,000 to £500,000 by the creation of 250,000 new shares.

S. Smith & Sons (Motor Accessories), Ltd.—A meeting was called for yesterday of the holders of the company's 8½ per cent. first mortgage debentures. A resolution was to be submitted providing for a further postponement of the commencement of drawings and contributions to the sinking fund until October, 1926, and January, 1927, and to postpone the ultimate redemption date to 1938.

Western Union Telegraph Co. (Inc.).—A report covering the period from January to September (nine months) shows that the gross revenues amounted to $94,141,130, as compared with $84,861,418 in the equivalent period of last year. The total expenses increased from $73,615,988 to $80,843,586, and the net income from $9,511,355 to $11,545,490.

Stock Exchange Notice.—Dealings in the following have been specially allowed by the Committee under Rule 159:—
Shropshire, Worcestershire, and Staffordshire Electric Power Co.—14,145 6 per cent. cumulative preference shares of £1 each, fully paid, Nos. 1,145,856 to 1,160,000.

Lancashire Electric Light and Power Co.—A meeting of the shareholders was to be held yesterday (Thursday) to sanction the creation of 250,000 new £1 shares, increasing the ordinary capital to £1,000,000. It is proposed to issue these shortly, and present shareholders will be given preference.

Dumbarton Burgh and County Tramways Co., Ltd.—The report for the year ended July 31st shows an available balance of £2,781, as compared with £3,079 in 1924. Of this amount £2,781 has been set aside for debenture stock redemption, and the balance (£202) is carried forward.

Montreal Light, Heat and Power Consolidated.—A dividend of $2 per share has been declared on the common and preferred shares in respect of the quarter ending October 31st.

Glenfield & Kennedy, Ltd.—An interim dividend of 4 per cent. has been declared on the ordinary shares, as compared with 2½ per cent. in 1924.

United River Plate Telephone Co., Ltd.—The directors propose to pay an interim dividend of 3 per cent., free of tax, on the ordinary shares, as in 1924.

Stanton Ironworks Co.—An interim dividend of 4 per cent., free of tax, has been declared on the ordinary shares, as in 1924.

Calcutta Tramways Co., Ltd.—An interim dividend of 4 per cent. (actual), free of tax, has been declared on the ordinary shares.

Stocks and Shares.

MONDAY EVENING.

STOCK Exchange markets—or, to be more accurate, some of the Stock Exchange markets—are extremely busy. In illustration it may be mentioned that the price of Stock Exchange shares has risen from 116 a month ago, to 130, ex 48s. dividend, to-day. A "nominational," without the acquisition of which no candidate can obtain membership, changed hands at £80 five weeks ago, but the price is now nearer £500. Cable manufacturing shares, and electrical equipment issues, are remarkably better on the week. New stocks and shares find a welcome ready-made if they offer any reasonable temptation to the investor and the speculator.

Advances have occurred in British Aluminium, Brush, Callenders, Edisons, English Electrics, Generals, Johnson and Phillips, Henleys, Siemens, and others. References to our price lists will show the unusual strength displayed by this department. Moreover, the seller will find it much easier to deal at middle prices than the buyer. The supply of shares is extremely limited. In a few cases the dealers prefer not to sell at all, because they do not know where to go to replace what they part with; in other cases buyers are told that they may have to wait some considerable time, if they insist upon dealing, before delivery is likely to be effected.

Iron, steel, and engineering shares have advanced materially. Babcock, ex 1s. dividend, are 3s. 6d. up to 2½. It is said that a campaign has been quietly organised, in high official quarters, to preach "prosperity" to the nation, and that this has started the rise in "heavy" shares, in shipping and in railway stocks. Central London Assented ordinary, Metropolitan Consolidated, Districts and Undergrounds are all higher, and the market for steam stocks is as good as that for what are called the Tube issues.

Colonial and foreign traction descriptions follow the same upward path. Anglo-Argentine Tramways firsts are 1/16th lower, but the British Columbia, Brazil Tractions, Rio Tramways seconds, Mexican Light and Power preferred are amongst those which have gained on the week. British Columbia stocks, in particular, are a strong market.

One of the new company registrations is Electricity Distribution of North Wales and District, formed with a capital of 200,000 preference shares of £1 each and 110,000 ordinary shares of 1s. each.

Cable and telephone stocks are not behind the general list in the firmness of their market. Chili Telephones have put on 11s. 3d. to 6 5/16ths, owing to the permission for an increase in the company's scale of rates. United River Plates continue their steady rise, and are ¼ better at 7¾. The new shares stand at 2¼ premium over the issue price. Indo-Europeans have gained 35s. The Eastern stocks and shares are strong. Anglo-American preferred is 1 higher at 102 ex dividend. In the wireless division, Canadian Marconis have been up to 7s. 6d., but relapsed a few pence. Marconis remain at 28s. 9d., and Marines can be bought at 17s. 7½d. Burndept preferred and deferred found strong support from United States buyers.

Details given here last week (ELECTRICAL REVIEW, p. 670) of the offering of American Utility issues on this side have aroused attention, and some inquiry as to what companies are concerned. There are several. One that may serve as an illustration is the Central Illinois Public Service Company. This undertaking, according to particulars in London circulation, furnishes electric light and power directly to 194 communities in Illinois. It sells electrical energy at wholesale (*sic*) to 26 other public utility communities; serves eight communities with gas, 11 with water, five with heat, and five with electric railway service, and electric intersuburban railways are operated. It further operates 11 ice plants. The registrars and the transfer office are in Chicago.

These, and other similar American utility companies may be—and doubtless are—excellent institutions, but, without expressing any opinion upon the security offered by their shares, the opinion may be reiterated that British capital can find employment to equal advantage in British companies. The latter require money for development that can give employment to large bodies of British workmen, and the extension of the electrical field in this country will help to remove the reproach, so often heard from Americans, that Great Britain lags behind in the provision of the facilities to all kinds of industry that electricity alone can afford.

London supply shares are quiet. County ordinary have regained 1s., and the new preference can be sold at 21s. 1½d. premium. Urban preference at 18s. 9d. ex dividend pay £6 8s. per cent. on the money, and look a reasonable speculative investment at that level. Some of the provincial companies' shares have eased off a trifle. Clyde Valleys are 1s. lower at 27s. 6d.; falls of 6d. apiece have left Lancashires at 25s. 6d. and Midland Counties at 22s. 3d. Geographically, the electricity supply market is located in the Stock Exchange cheek-by-jowl with the rubber share department, in which business is still upon an enormous scale, dwarfing interest in some of the more humdrum markets where price fluctuations occur more calmly and less frequently. Confidence in continuance of strength in rubber shares remains unabated.

Share List of Electrical Companies

	Nom. £	Dividend. 1923.	1924.	Price Oct. 26. 1925.	Rise or fall.	Yield p.c.
Home Electricity Companies						
Bournemouth and Poole	1	13	14	2⅛	—	4 15 4
Brompton Ordinary	1	10	10	1⅝	—	*5 14 3
Charing Cross Ordinary	1	14½	15	£0/-	—	6 2 5
do. do. 4½ Pref.	1	4½	4½	17/6	—	5 2 10
Chelsea	1	12	12	1⅞	—	6 8 0
City of London	1	15	15	47/-	—	6 7 4
do. do. 6% Pref.	1	6	6	23/-	—	5 4 4
Clyde Valley	1	8	8	27/6	—1/-	5 16 4
County of London	1	15	15	57/-	+1/-	5 5 2
do. do. 6% Pref.	1	6	6	23/-	—	5 4 4
Edmundson's Ordinary	1	7	7	22/-	—	6 7 3
do. 7% Pref.	1	6	7	21/6	—	6 10 3
Elec. Supply Corporation	1	10	10	31/3	—	6 8 0
Kensington Ordinary	5	14	15	12¾	—	5 16 8
Lancs. Light and Power	1	7½	7½	25/6	—¼d.	5 17 8
London Electric	1	10	10	34/-	—	5 17 8
do. do. 6% Pref.	5	6	6	5½	—	5 7 10
Metropolitan	1	10	11	38/4	- 2/-	5 14 4
do. 4½% Pref.	1	4½	4½	17/6	—	5 2 10
Midland Counties	1	6½	6	22/3	—6d.	5 7 10
Newcastle-on-Tyne Ordinary	1	6	7	22/-	—	6 7 5
do. 5% Pref.	1	5	5	18/9	—	5 6 8
do. 7% Pref.	1	7	7	24/-	—	5 16 8
Notting Hill 6% Pref.	10	6	6	9½	—	6 6 4
North Met. Elec. 6% Pref.	1	6	6	22/-	—	5 9 1
St. James' and Pall Mall	5	17½	17½	14¾	—	5 17 8
South London	1	15	15	2⅞	—	5 17 1
South Metropolitan Pref.	1	7	7	1¼	—	5 12 0
Urban Ordinary	1	4	4	18/3	—	4 7 8
do. 6% Pref.	1	6	6	18/9xd	—	6 8 1
Westminster Ordinary	1	15	15	44/6	—	6 14 10
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	1	—	7 10 0
Yorkshire Elec.	1	8	8	29/6	—	5 8 6
Home Rails.						
Central London Ord. Assented	Stock	4	4	67	+1	5 19 5
Metropolitan	,,	4	5	71	+ ½	7 0 10
do. District	,,	3½	3½	47	+3	7 9 1
Underground Electric Ordinary	10	Nil	Nil	2⅜	+ ¼	Nil
do. do. "A"	1/-	Nil	Nil	7/-	+6d.	Nil
do. do. Income Bonds	6	6	6	97	—	*6 3 9
Telegraphs and Telephones.						
Anglo-Am. Tel. Pref.	Stock	6	6	102xd	+1	5 17 8
do. Def.	,,	1½	1½	24½	—	6 3 9
Automatic Telephone	1	3	6	47/6	—	2 10 7
Chili Telephone	5	6	5	6⅞	+ 1/16	*4 7 0
Cuba Sub. Ord.	10	5	5	6⅜	+⅛	7 8 2
Eastern Extension	10	10	10	17½	+ ⅜	*5 14 3
Eastern Tel. Ord.	Stock	10	10	174½	+4	*5 14 7
Globe Tel. and T. Ord.	,,	10	10	17⅜	+ ⅛	*5 12 8
do. do. Pref.	10	6	6	11	+ ⅛	5 8 1
Great Northern Tel.	10	22	22	35	+1⅜	6 5 9
Indo-European	25	7	8½	44½xd	+ ½	*4 15 6
Marconi	1	10	10	1 7/16	—	6 19 2
Marconi Marine	,,	1	10	7⅛	⅛	— 8 11 6
Oriental Telephone Ord.	1	12	12	2½xd	+2/-	*5 13 4
United R. Plate Tel.	5	8	8	7⅜	+⅛	5 8 6
Western Telegraph	10	10	10	16⅞	+ ⅜	*5 19 5
Home and Foreign Trams, &c.						
Anglo-Arg. Trams First Pref.	5	5½	5½	3 5/16	— 1/16	8 6 0
do. do. 2nd Pref.	5	6	6	9⅜	—	8 17 10
do. do. 5% Deb.	Stock	5	5	77½	—	6 9 0
British Electric Traction Ord.	,,	6	6	129½	+1	4 18 9
do. do. 6% Pref.	,,	6	6	107	—	5 12 2
Brazil Traction	100	4	4	81	+2½	4 18 9
Brit. Columbia Elec. Rly. Pcc.	Stock	5	5	89½	—	5 11 9
do. do. Preferred	,,	26/-	26/-	93½	+1	*5 3 0
do. do. Deferred	,,	129/5	129/5	114½	+2	*5 13 4
do. do. Deb.	,,	4½	4½	77½	—	5 9 8
Lond. & Sub. Trac. 5% Pref.	1	2½	Nil	4/6	—	Nil
London United Tram. Deb.	Stock	4	4	43½	—	9 8 4
Mexico Trams, 5% Bonds	—	5	5	63½	—	7 17 6
Mexican Light Common	100	Nil	Nil	32	—	Nil
do. Pref.	100	Nil	Nil	63½	+1½	Nil
do. 1st Bonds	—	5	5	69½	—	7 3 11
Yorkshire (West Riding)	1	5	—	18/9	—	5 6 8
Manufacturing Companies.						
Babcock & Wilcox	1	12	12	23xd	+3/6	*4 11 5
British Aluminium Ord.	1	5	10	1⅛	+ 1/16	5 6 8
British Elec. Transformer Pref.	1	Nil	7	1	—	... ...
British Insulated Ord.	1	15	15	3⅞	+ ¼	4 0 0
Brush Ord.	1	10	10	23/9	+1/9	8 8 5
Callenders	1	15	15	3½xd	+2/3	4 12 4
do. 6½% Pref.	1	6½	6½	23/9	—	5 9 5
Crompton Ord.	1	Nil	Nil	⅜	—	... ...
Edison-Swan	4/-	10	10	9/3	+1/9	5 6 8
do. 5% Deb.	Stock	5	5	80½	—	6 4 3
Electric Construction	1	10	10	1⅜	+ ⅛	6 3 1
Enfield Cable, Pref.	1	7½	7½	1¼	—	6 0 0
English Electric	1	5	5	18/3	+1/-	5 9 7
do. do. Pref.	1	6	6	20/-	—	5 17 1
Gen. Elec. Pref.	1	6½	6½	23/9	—	5 9 5
do. Ord.	1	5	7½	29/-	+3/-	5 3 5
Henley	1	15	15	3 1/16	+ 1/16	4 16 5
do. 4½% Pref.	5	4½	4½	4½	—	5 6 0
India-Rubber	1	5	5	1 5/16	—1/8	*4 16 10
Johnson & Phillips	1	10	10	54/9	+4/-	3 13 0
Met-Vickers, Ord.	1	8	8	24/-	+1/6	6 10 8
do. Pref.	2	8	8	2⅜	—	6 14 9
Siemens Ord.	1	—	7½	32/-	+1/8	4 13 9
Telegraph Construction	12	20	20	26½	—	4 10 0

* Dividends paid free of Income Tax.

Market Quotations for Chemicals and Metals.

It should be remembered, in making use of the figures appearing in the following list, that in some cases the prices are only general and they may vary according to quantities and other circumstances.

CHEMICALS, &c	Price October 27th.	Fortnight's Inc. or dec.
a Acid, Oxalic per lb.	5¾d.	..
a Ammoniac, Sal per ton	£60	..
a Ammonia, Muriate (large crystal) ,,	£50	..
a Bisulphide of Carbon ,,	..	..
a Borax ,,	£26	..
a Copper Sulphate ,,	£25 10s.	..
a Potash, Chlorate per lb.	4d. to 4¼d.	..
a ,, Perchlorate ,,	5½d.	..
a Shellac per cwt.	£15 15s.	..
a Sulphur, Commercial ,,	£8 10s.	15s. inc.
a ,, Roll ,,	£8 10s.	15s. inc.
a Soda, Chlorate per lb.	3½d. to 3¾d.	..
a ,, Crystals per ton	£5 to £5 5s.	..
a Sodium Bichromate, casks per lb.	4d.	..
METALS, &c.		
b Aluminium, Ingots per ton	£120 to £125	..
b ,, Wire per lb.	1/9 to 2/6*	..
b ,, Sheet ,,	1/8 to 2/-	..
p Babbitt's Metal and Anti-friction Metal—		
Grade I per ton net	£95 5	£6 inc.
Grade II ,, ,,	£182	£4 inc.
Grade III ,, ,,	£102	£1 inc.
c Brass (rolled metal 2" to 12" basis) per lb.	10½d.	..
c ,, Tubes (solid drawn) ,,	1/- to 1/0½	..
c ,, Wire, basis ,,	10¾d.	..
c Copper Tubes (solid drawn) ,,	1/1½	..
c ,, Bars (best selected) per ton	£92	£1 inc.
c ,, Sheet ,,	£92	£1 inc.
c ,, Rod ,,	£92	£1 inc.
d ,, (Electrolytic) Bars ,,	£68 10s.	10s. inc.
d ,, ,, Sheets ,,	£145 10s.	..
d ,, ,, Wire Rods ,,	£78 10s.	10s. inc.
d ,, ,, H.C. Wire per lb.	9½d.	..
f Ebonite Rod ,,	2/3 to 2/5	..
f ,, Sheet ,,	2/3to 2/6	..
a German Silver Wire ,,	2/6	..
h Gutta-percha, fine ,,	8/0	..
h India-rubber, Para fine ,,	3/9	7½d. inc.
f Iron Pig (Cleveland Warrants) ... per ton.	nom.	..
f ,, Wire, galv. No. 8, P.O. qual, ,,	£91	..
g Lead, English Pig ,,	£40 15s.	5s. inc.
g Mercury per bot.	£13 17s. 6d. to £14	7s. 6d. to 10s. inc.
e Mica (in original cases) small ... per lb.	8d. to 8/-	..
e ,, ,, medium ,,	4/- to 8/-	..
e ,, ,, large ,,	10/- to 20/- & up.	..
p Phosphor Bronze, plain castings ,,	1/3½	..
p ,, ,, drawn bars & rods ,,	1/8	..
p ,, ,, rolled strip & sheet ,,	1/5½	..
p ,, ,, wire ,,	1/3½	..
e Platinum ,, per oz.	£38	..
d Silicium Bronze Wire ,, per lb.	1/0½	..
r Steel, Magnet, in bars ,,	7½d.	..
n Tin, Block (English) per ton.	£285 to £285 10s.	£7 15s. inc.
p Wire, Nos. 1 to 16 ,, per lb.	4/1	..

*For 1 cwt. lots. Special quotations against definite specifications.

Quotations supplied by

a G. Boor & Co.
b The British Aluminium Co., Ltd.
c Thos. Bolton & Sons, Ltd.
d Frederick Smith & Co.
e F. Wiggins & Sons.
f India-Rubber, Gutta-Percha and Telegraph Works Co., Ltd.
g James & Shakespeare.
h Edward Till & Co.
i Bolling & Lowe.
j Richard Johnson & Nephew, Ltd.
n P. Ormiston & Sons.
o Johnson, Matthey & Co., Ltd.
o C. Clifford & Son, Ltd.
r W. F. Dennis & Co.

The Society of Technical Engineers.—At a full meeting held at its headquarters, London, on Saturday last, the Executive Council of the Society unanimously adopted the following resolutions:—

"That since a condition of membershiup of the new Staff Benefit Society being promoted by the Engineering and Allied Employers' National Federation is an undertaking not to belong to any professional protective organisation—all such organisations being covered by the ban against registered or unregistered Trade Unions—we call on all members of the engineering profession to refrain from joining this body, which deprives its members of their common rights of citizenship; further, that the action of the Employers' Federation would appear to be an affront to the engineering profession and an attack upon the peaceful policy of the third party in industry."

"That the Society of Technical Engineers would, however, welcome the participation of the Employers' Federation in promoting a staff benefit scheme without the obnoxious condition referred to above."

"That we have seen with sincere regret the resolution of the Trade Union Congress expressing disapproval of attempts "to foist upon industry third party ideas concerning the position of administrative staffs" and declaring that there can be no middle position between employers and labour; that this action of the Trade Union Congress is an unwarranted effort to coerce organisations of professional and administrative staff workers into the ranks of Labour and to dictate to them what their policy shall be; that in the face of this attack we reaffirm our adhesion to the third party position, in the confident belief that complete independence of control by the organisations of both the employers and the manual workers, such as the third party position secures, is the right policy for protective associations of professional and administrative staff workers."

The matter is referred to in our leading columns to-day.

Swedish Electrical Imports.

THE following figures, showing the values of the imports of electrical and allied goods into Sweden in 1924 are taken from the recently-published official trade returns. For purposes of comparison the figures for 1923 are given and notes of increases or decreases are made.

	Kronor. 1923.	Kronor. 1924.	Kronor. Inc. or dec.
Accumulators and parts thereof—unmounted cells—			
Total	82,000	34,000	– 48,000
Denmark	12,000	—	– 12,000
Germany	68,000	18,000	– 50,000
United States	2,000	16,000	+ 14,000
Accumulator plates—			
Total	665,000	672,000	+ 7,000
Denmark	42,000	41,000	– 1,000
Germany	570,000	594,000	+ 24,000
Great Britain	27,000	13,000	– 14,000
U.S.A.	23,000	23,000	—
Cells and batteries, whole or part mounted—			
Total	404,000	641,000	+ 237,000
Denmark	140,000	110,000	– 30,000
Germany	158,000	306,000	+ 148,000
Great Britain	14,000	99,000	+ 85,000
U.S.A.	78,000	101,000	+ 23,000
Boards for electrical instruments and apparatus, fitted—			
Total	150,000	151,000	+ 1,000
Denmark	17,000	13,000	– 4,000
Germany	123,000	131,000	+ 8,000
Great Britain	4,000	1,000	– 3,000
Special apparatus for electrical purposes:			
Röntgen ray apparatus—			
Total	238,000	192,000	– 46,000
Germany	200,000	164,000	– 36,000
U.S.A.	21,000	9,000	– 12,000
Wireless telegraph and telephone apparatus—			
Total	1,963,000	2,993,000	+1,030,000
Germany	198,000	1,191,000	+ 993,000
Great Britain	70,000	549,000	+ 479,000
U.S.A.	1,586,000	408,000	–1,178,000
Other special apparatus for electrical purposes—			
Total	1,500,000	4,369,000	+2,869,000
Denmark	103,000	183,000	+ 80,000
Germany	949,000	1,399,000	+ 450,000
Great Britain	196,000	2,192,000	+1,996,000
Switzerland	25,000	26,000	+ 1,000
U.S.A.	180,000	269,000	+ 89,000
Galvanic cells—			
Total	1,223,000	1,305,000	+ 82,000
Denmark	431,000	455,000	+ 24,000
Germany	720,000	770,000	+ 50,000
Generators, motors, &c., weighing not more than 50 kilos each—			
Total	1,169,000	1,144,000	– 25,000
Denmark	213,000	110,000	– 103,000
Germany	635,000	562,000	– 73,000
Great Britain	127,000	83,000	– 44,000
U.S.A.	137,000	315,000	+ 178,000
Ditto, weighing more than 50 but less than 100 kilos—			
Total	184,000	135,000	– 49,000
Germany	130,000	83,000	– 47,000
U.S.A.	13,000	17,000	+ 4,000
Ditto, weighing more than 100 but less than 500 kilos—			
Total	381,000	300,000	– 81,000
Denmark	32,000	23,000	– 9,000
Germany	307,000	213,000	– 94,000
Ditto, weighing more than 500 but less than 3,000 kilos—			
Total	247,000	443,000	+ 196,000
Denmark	45,000	12,000	– 33,000
Germany	181,000	382,000	+ 201,000
Great Britain	19,000	39,000	+ 20,000
Ditto, weighing more than 3,000 kilos—			
Total	415,000	123,000	– 292,000
Denmark	11,000	12,000	+ 1,000
Germany	403,000	52,000	– 351,000
Transformers, 100 to 500 kg.—			
Total	69,000	61,000	– 8,000
Germany	54,000	51,000	– 3,000
U.S.A.	11,000	1,000	– 10,000
Transformers over 3,000 kg.—			
Total (all from Germany) ...	91,000	32,000	– 59,000
Metal filament lamps—			
Total	3,679,000	4,264,000	+ 585,000
Denmark	463,000	244,000	– 219,000
Germany	1,267,000	1,737,000	+ 470,000
Netherlands	1,420,000	1,940,000	+ 520,000
Belgium	132,000	65,000	– 67,000
Lamp sockets, with and without switches—			
Total	346,000	312,000	– 34,000
Germany	334,000	287,000	– 47,000
Insulating tubes, steel armoured—			
Total	59,000	29,000	– 30,000
Germany	56,000	29,000	– 27,000
Insulating tubes, other kinds—			
Total	344,000	267,000	– 77,000
Germany	310,000	261,000	– 49,000
Carbon, not specially mentioned, manufactured for electrical purposes, weighing 3 kilos or more—			
Total	654,000	744,000	+ 90,000
Germany	470,000	320,000	– 150,000
Carbon brushes—			
Total	73,000	75,000	+ 2,000
Germany	11,000	11,000	—
Great Britain	55,000	56,000	+ 1,000
Carbon: Other kinds—			
Total	639,000	707,000	+ 68,000
Germany	531,000	243,000	– 288,000
Starting, regulating, and reduction resistances, controls, and other electric regulators—			
Total	288,000	292,000	+ 4,000
Germany	236,000	216,000	– 20,000
Bases for incandescent lamps—			
Total	678,000	512,000	– 166,000
Germany	541,000	456,000	– 85,000
Netherlands	134,000	55,000	– 79,000
Stators, rotors, current collectors, magnet coils, &c., weighing not more than 50 kilos—			
Total	72,000	90,000	+ 18,000
Denmark	21,000	21,000	—
Germany	34,000	33,000	– 1,000
Current interrupters and reversers, oil brake switches, hand-operated—			
Total	37,000	67,000	+ 30,000
Germany	31,000	61,000	+ 30,000
Box switches—			
Total	498,000	419,000	– 79,000
Germany	463,000	384,000	– 79,000
Knife switches mounted on slate slabs—			
Total	208,000	129,000	– 79,000
Germany	124,000	82,000	– 42,000
Other kinds—			
Total	169,000	185,000	+ 16,000
Germany	141,000	146,000	+ 5,000
Safety appliances, not specified—			
Total	862,000	540,000	– 322,000
Germany	808,000	514,000	– 294,000
Electric stoves for household use—			
Total	232,000	255,000	+ 23,000
Denmark	31,000	22,000	– 9,000
Germany	178,000	178,000	—
Electricity meters—			
Total	1,446,000	1,127,000	– 319,000
Germany	1,360,000	1,088,000	– 272,000
Netherlands	27,000	—	– 27,000
Belgium	23,000	14,000	– 9,000
Other electrical measuring instruments—			
Total	395,000	349,000	– 46,000
Denmark	14,000	17,000	+ 3,000
Germany	326,000	250,000	– 76,000
Porcelain insulators, conduit pipes, &c.: White—			
Total	454,000	263,000	– 191,000
Denmark	15,000	11,000	– 4,000
Germany	428,000	246,000	– 182,000
Ditto, other kinds—			
Total	142,000	176,000	+ 34,000
Germany	47,000	157,000	+ 110,000
U.S.A.	79,000	10,000	– 69,000
Electric lighting fittings of brass, coated, varnished and lacquered—			
Total	151,000	100,000	– 51,000
Germany	126,000	74,000	– 52,000
Cables and cords with sheaths of lead or other metal; maximum diameter 25 mm.—			
Total	520,000	544,000	+ 24,000
Denmark	22000	23,000	+ 1,000
Germany	482,000	492,000	+ 10,000
Ditto, of greater diameter—			
Total	460,000	2,058,000	+1,598,000
Denmark	21,000	9,000	– 12,000
Germany	427,000	1,486,000	+1,059,000
Ditto, not specified—			
Total	769,000	843,000	+ 74,000
Denmark	57,000	40,000	– 17,000
Germany	563,000	657,000	+ 94,000
Netherlands	43,000	35,000	– 8,000
Belgium	43,000	25,000	– 18,000

(£1=about 17 kr.)

Russian Electrical Notes.

Production of Apparatus.—The equipment at the Electro-apparat works, which has been under care and maintenance, has now been restored and production was to be started again by the Leningrad Machine Trust at the beginning of October.

Credit Facilities.—In the interest of facilitating the securing of credit for electrical works, the directors of the Electrical Bank reduced on October 1st the rate of interest on long-term loans from 12 to 10 per cent. Moreover, the bank has put forward an application for permission to extend the period for long-term loans from 10 to 12 years.

Wireless Apparatus.—The Radio Transmission Company has just placed orders with the Leningrad Low-Pressure Trust for the delivery of wireless apparatus for the sum of 5,000,000 roubles. As the country's production is insufficient to satisfy the home demand, the company has made application for permission to purchase wireless apparatus abroad for the amount of 1,300,000 roubles.

The Schatur Station.—The first turbo-generator of 16,000 kW at the Schatur station was brought into regular operation at the end of September, the current being transmitted along an overhead line at 115,000 volts to Moscow. It is proposed to start the second machine of the same size in November when, besides supplying Moscow, current will be furnished to a number of industrial undertakings.

Rural Electrification.—The General Electrical Commission has forwarded to all organisations connected with works of rural electrification a request to prepare a definite number of standard types of installations, which are to be summarised and considered at a special conference. At the same time the Electric Planning Commission has decided that it is necessary for the assignments in the budget for 1925-26 for works of rural electrification to be increased from 10,000,000 to 15,000,000 roubles.

As a consequence of the absence of information concerning small installations in, and the actual application of electrical energy in the agricultural industry, the General Electrical Commission six months ago dispatched a representative to make an investigation of the question in the districts of Kostromsk, Yaroslav, and in various parts of the Ukraine (Kharkoff, Poltav, Kieff, Kherson, Pervomaisk, &c.). The inquiry has revealed the fact that small fuel stations and small hydro-electric stations predominate in the agricultural districts visited, these being of a capacity of only from 40 to 50 kW, and in a few cases of 150 kW. Most of the stations only serve for lighting, there being no power load, and they do not work all the year round. The information collected will be utilised in dealing with the question of loans for the electrification of agricultural districts.

Rural Supply Schemes.—The National Commissariat for Agriculture has opened an international competition for the submission of rural electrification schemes. Entries are said to have already been received from foreign firms, and American firms are stated to have asked for an extension of the time for the presentation of projects.

Foreign Turbo-Generators.—According to a report placed before the General Electrical Commission, turbo-generators of 5,000-kW capacity, the construction of which in Russia is still under contemplation, can be ordered abroad at prices which are considerably lower than those quoted by the electrical trusts. Also, the foreign sets are more economical in working and can be delivered in a shorter time than by the Soviet works. In view of these circumstances, the Commission has decided to ask the General Metal Commission and the General Electrical Trust to present a report concerning the prospects of the construction of turbo-generators in Russia and of the possibility in the next few years of reducing to a minimum the difference between home and foreign prices, quality, and time of construction.

A Large Generator from England.—The Electrotok, of Leningrad, is reported to have placed an order in England for the delivery of a generator of a size hitherto not used in Russia.

Turbo-Generator Performance.—The Leningrad Electric Machine Trust is reported to have received information from Rostoff that the 3,000-kW turbo-generator, which was the first of this size to be made in Russia, has just been put into operation. The results have been satisfactory and the steam consumption is claimed to be lower than in the case of foreign turbo-generators.

Large Steam Turbine.—The Leningrad Metallurgical Works has begun the assembly of a 10,000-kW steam turbine which was ordered by the Southern Steel Trust for the Briansk iron and steel works. This is the first machine of the size which has been constructed at the works.

New Manufacturing Works.—The General Electrical Commission has presented to the Supreme Council of National Economy a report on the proposed capital expenditure on the electrical manufacturing industry in the year 1925-26, which commenced on October 1st, 1925. Of the total, it is proposed to apportion 17,000,000 roubles to the heavy branches, 4,268,000 roubles to the Low-Pressure Trust, 230,800 roubles to the Accumulator Trust, and 150,000 roubles to the Karbolit works. New producing works are included in the total for the sum of 8,879,000 roubles; the provision of new equipment represents 8,182,000 roubles, and repair works 2,904,000 roubles. As to the necessity for the establishment of entirely new works it is mentioned that the firm orders on the books of the trusts at the present time already represent 65 per cent. of the productive programme of the General Trust (the amalgamated Central and the Leningrad Electrical Machine Trusts) for 1925-26, 65 per cent. in the case of the Low-Pressure Trust, and 55 per cent. in that of the Accumulator Trust. It is proposed to begin the construction of new works for the manufacture of standard sizes of machines, and to reconstruct the former Provodnik works for the turning out of small transformers, machines, and lamps. It is expected that the total capital outlay will have the effect of increasing by 63 per cent. the value of the total output of all the producing branches, while at the same time it is anticipated that the prime costs will be reduced by 14 per cent.

Ural Extensions.—It is reported from Sverdlovsk that the Ural District Council of National Economy has prepared a scheme for the extension of the Eropshin station in order to be able to supply energy to the Alapaeff works and asbestos mines. It is proposed to install two 3,500-kW turbo-generators and to transmit the power to the works and the mines by overhead lines. The initial extension of the station to 4,500 kW will involve an expenditure of 2,310,000 roubles, and the work is to be completed by next April.

A New Kaschir Station.—Preparatory works have begun in connection with the construction of a new Kaschir station, which will be equipped with two 20,000-kW turbo-generators. The existing Kaschir station, which can no longer satisfy the growing demand in Moscow, will be kept in reserve on the completion of the new works, one half of which is expected to be ready in the autumn of 1927.

A Large Combination.—The State Planning Commission has approved a scheme for the formation of a big union of interests by the amalgamation of the "Moges" (Moscow and district supply organisation), the Moscow tramway power station, the Electrical Transmission concern, and the Kaschir and Schatur regional stations, together with the sub-stations, peat-producing, and auxiliary undertakings. All these represent a total capital of 63,834,000 roubles, and the name "Moges" will be retained.

The Moscow Cable Network.—As a result of an investigation made by a committee of the Supreme Council of National Economy, it has been found that recent interruptions in the electricity supply in Moscow have been due to short circuits in parts of the cable network. The committee has decided that it is necessary to carry out the reconstruction of the network in the near future. The supply authority, known as the "Moges," intends to replace the existing oil-break switches and cut-outs at all important parts of the network.

Hydro-Electric Works.—A new hydro-electric works of 5,000 kilowatts is to be constructed to utilise the fall of the River Velikoi, about eight miles from Pskov. The preliminary works have been entrusted to the Electropomosh Company.

A New Accumulator.—Prof. A. F. Joffe, of Leningrad, claims to have evolved a new accumulator which permits of the concentration of a large amount of energy within a small space. Work is now being carried out with a view to the application of the discovery to industrial purposes.

Manufacturing Profits.—The Electric Machine Trust, of Leningrad, which has now been amalgamated with the Central Electrical Trust, reports that the value of its turnover in the year ended September 30th last amounted to 30,000,000 roubles, as compared with 13,000,000 roubles in 1923-24. A profit of 2,000,000 roubles is claimed to have been made for 1924-25.

Mine Electrification.—It is reported from Ekaterinoslav that work is proceeding in connection with the electrification of the manganese and iron ore mines in the district of Krivoi Rog. An installation of 3,000 kW is to be started early in January at the October mine. A station of 30,000-kW capacity is shortly to be constructed in the iron ore district.

A New Peat Fuel Station.—It has been ascertained that the development of industries in Leningrad will create such a large demand for energy that even the Volkhoff hydro-electric works will be unable to satisfy it. In the circumstances the question has been raised of constructing a new station based on the use of peat from the marshes, and a committee of the State Planning Commission has paid a visit to the locality with a view to the selection of a suitable site for the station, which is to be completed in 1927. Moreover, the committee has decided that it is also necessary to enlarge the capacity of the existing stations, particularly the second station, which is situated in the centre of the industrial district of Leningrad.

The Volkhoff Station.—The State Planning Commission estimates that the expenditure on works at the Volkhoff station from April 1st, 1925, down to its completion will amount to 27,000,000 roubles, of which 21,500,000 roubles is to be provided in 1925-26.

The Textile Machinery Exhibition, 1925.

A Review of the Electrical Features of the Manchester Show.

(*Concluded from page 677.*)

T. Broadbent & Sons, Ltd.

Besides the well-known centrifugal clutch some hydro-extractors were on view, including one 48-in., directly-suspended, electrically-driven model. The motor revolves round the centre spindle and drives through a centrifugal clutch, thus being protected from damage, and resulting in a much reduced starting current being required.

Root Co.

This American firm showed counting devices for various purposes, particularly textile, the motors and control gear provided for them being of Metropolitan-Vickers manufacture.

Hindle, Son & Co., Ltd.

This company showed a 25-ton electric baling press with a d.c. reversing drive, series-wound, which automatically varies the speed according to the work being done. An overload circuit-breaker is provided in order that the motor may be stopped on maximum pressure being exerted, and it is also automatically brought to a standstill at the top and bottom limits of the travel. About 100 bales, it is claimed, can be pressed for one kWh of electricity. The presses are also supplied for a.c. circuits.

Roto-Sign Co.

On the stand of Messrs. J. H. Fenner & Co., Ltd., leather belting manufacturers, an electrically-operated moving sign supplied by the Roto-Sign Co. showed how this form of publicity may be used in an exhibition without any feeling of ostentation.

Metropolitan-Vickers Co., Ltd.

Of its two stands one was utilised as an office and the other for the display of a 680/1,000-b.h.p. turbine designed to run at 4,500 r.p.m. The low-speed shaft of the gears runs at 500 r.p.m., and the set was made for driving direct the main shaft of a mill in India. In addition, the firm had motors and control equipment running on many stands, including those of T. Broadbent & Sons (hydro-extractors), Universal Winding Co. (textile winders), Mellor, Bromley & Co. (hosiery machinery), Hoffmann Manufacturing Co., Carver Textile Patents, Ltd. (patent electromechanical loom, described last week), and Oscar Kohorn & Co. (artificial silk machinery).

Belliss & Morcom, Ltd.

A high-speed engine of the enclosed type was shown with the front doors removed so that the working parts could be seen. The engine was driven round slowly by a 2-h.p. "Lancashire" motor operating through Wallwork worm gear and a Hans Renold chain drive. The high- and low-pressure cylinders are 14¼ in. and 21 in. diameter, respectively, with a piston stroke of 10 in., and exert 265 b.h.p. at normal full load and 330 b.h.p. overload, operating with steam at 150 lb. pressure and exhausting at 15 lb. back pressure to the heating system of the works in which it is to be installed. The engine runs at 425 r.p.m., and can be arranged to drive either an electric generator, or a pulley for rope transmission; it has been sold to the Calico Printers' Association.

Andrew Machine Construction Co., Ltd.

In addition to a working exhibit of patent humidifying plant, an electrically-driven air cleaning, purifying, and ventilating machine was shown which provides a method of disinfection and is easily portable.

Laminated Gears, Ltd.

A train of gears reducing, by means of five reductions, from a motor speed of 715 r.p.m. to 1¼ r.p.m.; also a bedplate carrying ball-bearing motor and backshaft with laminated gears reducing from 706 r.p.m. to 143 r.p.m. There was also a speed-increasing set with the high-speed shaft running at 6,400 r.p.m.

Daniel Foxwell & Son.

The Kent patent electrical indicator, when fitted to an automatic cloth guider, enables one operative to mind more machines single-handed than at present on account of the fact that, should any fault occur in the selvedges of the cloth going to any machine, he will be immediately notified of it in an audible manner. If the selvedge of the cloth, or any portion of them, should for any reason travel beyond a predetermined distance away from their true line, the electric circuit is closed, thus causing the bell to be rung. A different tone for each machine enables the operative to know exactly where the trouble is.

Joseph Stubbs, Ltd.

These well-known textile machinists had a number of winders for textile use driven by electric motors supplied by Electromotors, Ltd. Each machine was driven by an individual motor either by chain drive or spur gearing.

Markt & Co. (London), Ltd.

This company showed for the first time in this country the new Veeder magnetic counter, fig. 7. This is operated by electromagnets, and with an 80-ampere-hour storage battery with the time of contact of the commutator adjusted to the minimum required to operate properly, the small U magnet counter should run to 5,000,000 and the large magnetic counter to 10,000,000 counts on one charge. The magnetic counter is essential under conditions where it is desirable that the counter be placed at some distance from the machine on which the count is to be taken. A number of counters can be grouped together in a central convenient place. It is also desirable where articles counted are very small, or thin, or light in weight, making it difficult to count them by mechanical means. Because no extra contact device need be provided, the magnetic counter is especially useful in conjunction with other devices already electrically operated, where it is desired to know the number of times these devices are started or stopped, such as lifts. In such cases, the counter could be connected in shunt or in series with the device in question.

The mechanism which moves the number wheels in counting has two motions: one, forward under the influence of the

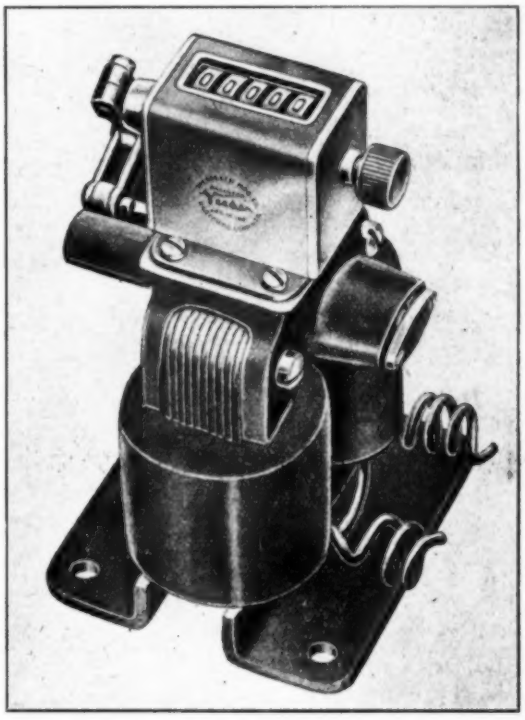


Fig. 7.—"Veeder" Magnetic Counter.

electro-magnets when the contact is made and which moves the counting wheel; and, secondly, the return movement under the influence of a spring which returns the mechanism and completes the cycle. Should the time of contact be too short, the first movement will not be completed, and if there is not sufficient time between breaks (when the current is off) the return movement will not be completed before again starting forward under the force of the magnets.

Although the counter may be placed in a detached position relative to the machine upon which the count is required, it is necessary to provide some mechanical device which will close and break the electrical circuit which operates the counter. The "wipe" style of contact can be used as a revolving, oscillating, or sliding member, and may be a simple contact of metal on the moving member coming in contact with a spring attached to a non-moving member. Another form would be a commutator of one bar on the circumference of a drum made of non-conducting material, with a brush of metal or carbon. The wipe contact has the advantage that, due to wear of the contact surfaces, ordinary material may be used, as any corrosion due to sparking tends to be worn away by the friction between the parts. The "touch" contact should be used where a very slight or short movement only is available; the contacts must be of suitable material, such as iridium, platinum, or tungsten, that will not corrode as a result of sparking on the break of contact. Care must be exercised to obviate double con-

tacts due to vibration or other causes, in which case the counter would register one count for each make and break, whether caused by intent or accident.

Singer Sewing Machine Co., Ltd.

This company had on view a single power bench fitted with a high-speed enclosed-type of electric transmitter to ensure the sewing machine being driven at maximum speed. Another interesting exhibit was the two-needle lock-stitch machine fitted on a special bench, complete with guide rail, clip, slide and weight, for automatically guiding the cloth to the needles. The machine makes the overlap, or imitation hand-pasted, seam now in use at bleach, dye, and print works, and is driven by a small electric motor.

Mr. George Ellison.

This display included a range of low-pressure ironclad air-break and oil-break control gear for industrial motors. Special attention was drawn to the new draw-out type switchboard for currents up to 1,200 amp. at 600 volts; also suitable for 3,000 volts and 200 amps. Some good contracts have been carried out in Lancashire lately, amongst which might be mentioned the Black Pits Mill at Rochdale, where the installation was erected jointly with the English Electric Co.; Thos. Warburton's Waste and Weaving Mill at Haslingden, where ironclad low-pressure switchgear has been installed in the new extensions, and also control gear for a 250-h.p. motor for the opening machinery and two 100-h.p. and 75-h.p. motors; also two 1,200-amp. incoming panels for the electricity department of the Accrington Corporation.

Henry Lowe & Sons, Ltd.

This firm exhibited an electric lift head gear. The winding gear is of the worm type and is self-sustaining; it comprises an electric motor, electro-mechanical brake, worm reduction gear and winding pulley, all mounted as a complete unit. On this stand was also shown by Mr. T. Simpson a patent smoke burner for fitting to boilers. No alteration is required in the fire bars, bridge work, or flues, and no drilling of holes in the boiler is required. The claims made are that no cold air is allowed to reach the fire and no black smoke is emitted.

Moore & Avery, Ltd.

This company, represented by Mr. James Witnell, exhibited a patent automatic warp thread reaching-in machine fitted with a small electric motor of about ¼ h.p., which can be driven from the electric light mains if desired.

W. H. Allen, Sons & Co., Ltd.

This was one of the most interesting stands in the whole exhibition; a great deal of machinery had been brought to the stand, and prominent amongst it were a 1,500-kW high-pressure steam turbine and a 1,000-kW geared steam turbine

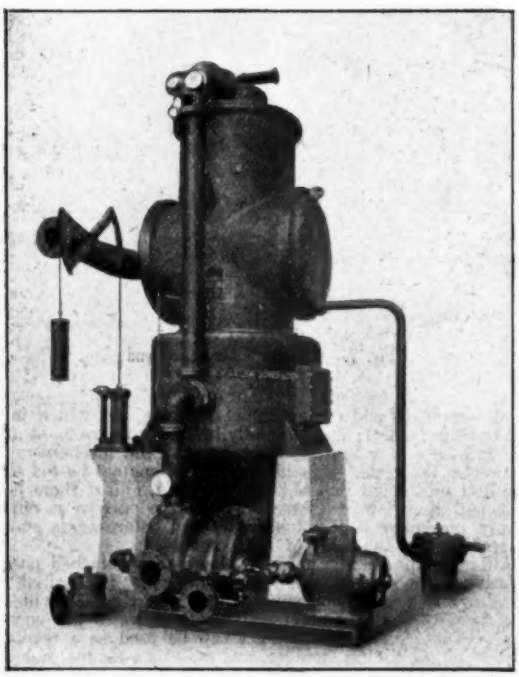
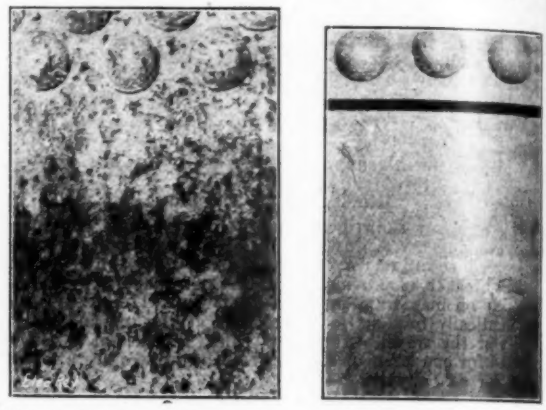


Fig. 8.—"Allen" Boiler Feed-water Deaerator.

for coupling direct to rope pulleys for driving textile mills. Apart from these, however, there were one or two matters of peculiar interest to electrical engineers. First, there was a model (one of four) of a surface condenser with 45,000 square feet of cooling surface for a power station in Japan. The advantage of the physical method of deaeration of the "Allen" deaerator (fig. 8), is that all gases in solution in the water are removed to the same extent in relation to their solubility, not oxygen only. In this plant violent ebullition and foaming are created in the water by flashing; the water is shattered into minute particles, which allow of the complete liberation of the gases contained. The flashing is accomplished by heating the water under vacuum and flashing it on a surface of high temperature. The apparatus is constructed in a self-contained unit with which very high degrees of deaeration are being obtained. The lower part contains a bank of steam-heated tubes over which the water falls. Preliminary deaeration takes place in the upper part, where the incoming water is heated to boiling point by the vapour rising from the hot tubular surface below. This hot surface acts like a pressure flash-boiler, and when the falling heated water comes in contact with it, it is



(A) Serious Pitting, without Deaeration. (B) No Pitting, with Deaeration.

Fig. 9.—Results of Deaeration.

repeatedly flashed as it falls from one tube to another on its way to the outlet, and the contained air thus liberated rises and is withdrawn at the top by a small steam-operated ejector, which maintains a vacuum in the deaerator corresponding to the temperature of the heated water. A float contained in the base of the deaerator controls the inlet of the water in accordance with the requirements of the boiler feed pump.

A large number of deaerators are said to have been manufactured and are now running in various power stations; in some plant the water entering them contains from 5 to 6 c.c. of oxygen per litre, but the deaerators are claimed to be removing 99 per cent. of that originally contained. Fig. 9A is a view taken inside the top drum of a boiler which has been run for ten months on undeaerated water. The serious pitting action that has taken place on the drum is clearly illustrated. Fig. 9B is a view taken in a similar position on a similar boiler in the same power station, but supplied for nine months with deaerated water.

Universal Winding Co.

Whilst it might not be thought that the very large stand of this company would provide matter of especial interest to electricians, reference should be made to the coil winders produced by this firm. The "honeycomb coil," renowned in radio circles, was a product of this firm's No. 84 machine. Another produces coils in "spool-wound form," each convolution of wire lying parallel and closely adjacent to the next one without any of the turns crossing. One of the latest machines winds the wire in the spool-wound form and at the completion of each layer injects a piece of prepared insulating paper between the finished and the new layers. This operation consists of completely encircling the coil with the paper and cutting it off in time for the next convolution of wire to wrap it in place. The machine winds coils from ½-in. inside diameter to 2-in. outside diameter on one type, or 9-in. diameter on another, and from ¼ in. to 2½ in. in length at a speed of from 200 to 1,200 r.p.m.

Samuel O'Neill & Sons, Ltd.

This exhibit consisted of paper tubes as used in the wireless, electrical, and explosive trades, in addition to the wide range of products for the textile industries.

General Electric Co., Ltd.

A comprehensive display of standard products as applied to textile drives included a 5-h.p., 400-volt, 950-r.p.m. self-contained driving unit, star-delta starter, and motor fitted with a centrifugal clutch, suitable for driving spinning, doubling frames, &c.; also a 15-h.p., 3-phase, 50-period, 400-volt, 900-r.p.m. motor with dustproof enclosed slip-rings, suitable for line shaft drives, and a number of small loom motors. The lighting was arranged in such a manner as to demonstrate the different kinds likely to be required in a textile mill, and there were also samples of cables, fittings, &c., suitable for textile mills and dye-houses.

Amongst the recent contracts dealt with by this firm is the electric driving of the Osborne Spinning Mills at Oldham. This is one of the oldest spinning mills and the installation has effected considerable improvements in the lay-out of the premises. A new sub-station has been erected and supplied with 3-phase current at 6,600 volts, 50 cycles, which is transformed to 400 volts. Three motors are installed in the tower, of the Witton 200-h.p. slip-ring type. There are also two 75-h.p. slip-ring motors in the blowing and card rooms,

equipped with pipe ventilation on account of the dust in the atmosphere. This installation is a good example of the manner in which the electrical drive can be put into premises constructed with very different intentions and shows the ease with which difficulties can be overcome.

Other Exhibits.

The whole of the machinery on the stand of Messrs. Asa, Lees & Co., was driven by electric motors with a centrifugal clutch on each shaft. The motor was coupled direct to the driving shaft of the ring spinning frame, the roving frame and others being each driven through a pair of laminated gears. The motors were supplied by Messrs. Mather & Platt, Ltd., the control gear by George Ellison, the clutches by Thos. Broadbent & Sons, and the gears by Laminated Gears, Ltd. Messrs. Platt Bros. & Co., Ltd., exhibited amongst other products a power loom, calico type, fitted with the Whittaker automatic weft replenishing attachment. The detector stop motion was by Mather & Platt and the loom was driven by a small independent motor lent by the English Electric Co., through a Renold chain and sprocket reducing gear. The "Wallace" centrifugal clutch manufactured by the Hele Shaw Patent Clutch Co., was also demonstrated. Messrs. Geo. Kent, Ltd., had a good display of their products, but the tests on the new "Telerecorder" are not yet quite completed and they were unable to show this new electrical steam-flow distant recording instrument. Other textile machine makers employed electrical power on their stands.

Conclusion.

Besides the English exhibitors, French, Swiss, Dutch, Spanish, Czecho-Slovakian, and German firms (including Siemens-Schuckert, Ltd.), displayed their wares. It is unlikely that any exhibition in the provinces could have been more successful than this one has been so far as one can judge at present. Not only have an immense number of inquiries been received, but actual orders have been booked on a substantial scale. The attraction of the ordinary public was very great and on the Saturdays the crowds were rendered a little unpleasant. On one day about 13,000 people came to the Hall. It might be thought that this was not in the best interests of business, but it must be borne in mind that a large number of these people were the operatives using the machines and as such were welcomed by the exhibitors. During the other days of the week the exhibition presented an animated appearance from morning until night and the many foreign and home buyers had ample opportunity to study the machinery displayed. All the electrical firms were enthusiastic as to results, and whilst it might appear in this survey that we have devoted too much space to matters other than purely electrical, we would say that in an exhibition such as this, one of the most prominent features is the plain fact that electricity is there to serve every requirement of the machinist. It is an integral part of textile machinery and a knowledge of the latter is absolutely essential to those hoping to extend the use of the former.

Scientific Shop-Window Illumination.

Commencement of the E.D.A. Conferences.

THE 1925-26 series of conferences arranged by the British Electrical Development Association in the London district was opened on October 15th, in the Lighting Demonstration Bureau of the Electric Lamp Manufacturers' Association, at Savoy Hill, when Mr. W. E. Bush, of the E.L.M.A., read a paper on "Selling Better Lighting to the Shopkeeper." His paper was repeated at another meeting on the following evening. Special facilities exist at the Bureau for demonstration, by means of which Mr. Bush was able to illustrate the difference between good, bad and indifferent lighting, with different intensities and lay-outs. Mr. C. W. Sully (Chairman of the E.L.M.A.) presided.

Mr. BUSH opened his lecture with a reference to a survey, recently undertaken by the E.L.M.A., of retail shops in the country, which had provided valuable information as a basis for a national sales campaign which was being conducted by the E.L.M.A. One of the things indicated by that survey was that two-thirds of the shop windows of this country were

Fig. 1.—A Typical Shop-window Reflector.

using modern lamps with equipment designed a quarter of a century ago. Whereas shopkeepers were guided by skilled designers with regard to their fittings and furnishings, in the matter of lighting they had been their own architects, and had merely substituted new lamps for old. The result was glare, hard shadows, discomfort to purchasers, and other evils, and considerable damage was being inflicted upon the electrical industry by exhibiting to millions of prospective consumers the crudest examples of electrical service. Judged by good modern practice, only 17 per cent. of the shop windows in the country were well lighted, and the position was little better in shop interiors. Mr. Bush deprecated the neglect of good lighting on the score of cost, and emphasised the necessity for bringing home to the shopkeeper the fact that good lighting was good advertising at very low cost. To indicate the enormous market awaiting the industry in this connection, he said that to raise the standard of shop lighting in this country even to a conservative basis a minimum of five millions sterling must be expended. The necessity for electrical contractors to adopt good window lighting before they could sell it to others has often been raised at these conferences, and in this connection Mr. Bush said the survey mentioned showed that on an average contractors' shops and supply undertakings' showrooms were worse than retail shops. If an electrical showroom were not suitable for making a display, he suggested that the supply undertaking and the contractors jointly should make arrangements with a shopkeeper to light his window as a permanent exhibit during the winter months.

Appealing for simplicity in submitting specifications, he pointed out that the standardisation of equipment and lighting practice rendered it unnecessary to spend time in lengthy calculations to design good installations, or to trouble shopkeepers with engineering technicalities. He recommended the following specifications for first-class lighting:—*Window lighting.*—Specially designed shop-window reflectors fixed close to the ceiling, fitted with 100-W gasfilled lamps, spaced 1 ft. apart for windows in main thoroughfares, and 2 or 3 ft. apart in side streets. *Shop lighting.*—Totally-enclosed dust-proof fittings 10 ft. apart, fitted with 200-W gasfilled lamps.

In a reference to the value of lectures and demonstrations to trade organisations throughout the country, he referred to literature published by the E.L.M.A., which included a specially-prepared lecture entitled "Light and the Shop-

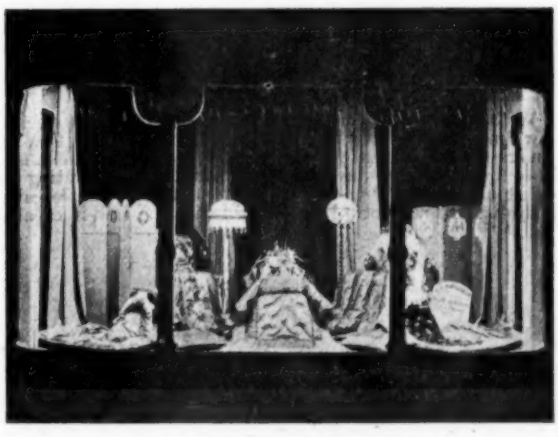


Fig. 2.—An Example of Good Shop-Window Lighting.

keeper," in booklet form. A model shop had also been prepared, by means of which every conceivable lighting system could be demonstrated in an appropriate setting. Mr. Bush appealed for co-operation between all sections of the industry, and for concentration on one aspect of electrical service at a time; the E.L.M.A had commenced by concentrating on shop lighting. There did not appear to be a saturation point until daylight levels were reached, and the 1925 standard would be far surpassed 10 years hence. He could foresee the time when super-lighting would be installed in the windows of all progressive stores in order to overcome daylight reflections.

Discussion.

In the ensuing discussion, Mr. James Edgar (South Shields) referred to lighting shop windows from outside, which, he considered, showed up the goods in the window less effectively than lamps installed inside. He also suggested that the E.D.A. and E.L.M.A. should impress upon the public the fact that supply authorities were anxious to advise them gratuitously with regard to their installations.

Mr. Blake urged greater confidence between the various sections of the industry in the work of raising lighting installations to a reasonable standard.

Mr. Herbert drew attention to the many small contractors in the country who had not sufficient knowledge to enable them to design an efficient installation, and who cut down specifications in order to reduce the price and secure an order; these contractors should be compelled to pass an examination to prove their ability.

Mr. R. C. Hawkins (E.L.M.A.) described some of his experiences as an investigator in connection with the E.L.M.A. survey. Most shopkeepers he had found to be sympathetic, but he agreed that many were afraid to ask the supply authority or a contractor for advice, for fear of being charged for it. They had been greatly impressed by demonstrations.

Mr. E. Boys (North Metropolitan E.P.S. Co.) asked for definite suggestions as to how to tackle the problem of shop lighting in bulk. He also referred to the case of a shopkeeper who, having been induced to display his goods in the North Metropolitan Co.'s showroom (the lighting being suitably arranged) had given an order to the value of £100 for the improvement of the lighting of his shop.

Mr. Abell referred to the difficulty of getting shopkeepers to dress their goods back from the glass of the window, and pointed out that in those cases outside lamps must be used. He asked whether the practice of using sprayed lamps without reflectors in windows had been successful.

Mr. Mason spoke of the importance of overcoming glare, and the consequent necessity for the salesman to have a scientific knowledge of illumination.

Mr. Houghton said it was valuable to establish one or two shops with properly lighted windows in a district, and to invite shopkeepers to inspect them.

Mr. Hayward considered that the cost of electricity should be reduced; some shopkeepers had reverted to the old standards on the score of cost.

Mr. A. Jones said that the cost of electric lighting was very small as compared with the other costs incurred by shopkeepers.

Mr. Bush, in reply, said he did not think outside lighting was good for the shopkeeper, or, ultimately, for the electrical industry. He would prefer that the electrical industry should go to the shopkeeper and offer advice. Though some existing installations could be improved by substituting sprayed lamps for those now used, he preferred the use of clear lamps in proper reflectors. There was no need to apologise for costs, but to justify them, because good lighting was positively business-building.

The Second Conference.

Mr. Bush's lecture was repeated on October 16th, when Mr. J. Y. Fletcher (G.E.C.) presided in the absence of Sir Hugo Hirst, Bart., through indisposition.

The Chairman said that in addition to the lighting bureaux which had been established recently in Glasgow and Newcastle (Electrical Review, October 23rd, pp. 672-3), there were plans for opening a similar establishment in Manchester, and it was hoped also to establish them in Leeds or Bradford, in Birmingham, and in Cardiff. For towns in which such bureaux could not be established, an attractive travelling bureau was being developed.

Mr. C. Hayes advocated prepayment meters for electricity consumers, as well as assisted wiring schemes.

Mr. Howard Smith agreed to the establishment of deferred-payment wiring schemes if the supply authorities gave the work to the contractors and did not carry it out themselves. He advocated the supply of electricity to shopkeepers at a reduced rate.

Mr. H. F. Simon said that invention had gone ahead faster than the education of the public. He also mentioned the value of good lighting with regard to health and efficiency.

Mr. H. J. Adams said that very often owners of large buildings which were leased as offices were opposed to improved lighting owing to the fact that they leased the offices at a figure which was inclusive of lighting, and wished to keep the cost down. An effort should be made to educate the owners of such buildings.

Mr. L. E. Buckle said that competition between groups of shopkeepers, rather than individuals, had proved valuable.

Mr. J. C. Chaytor said that, in his experience, the practice of affording facilities to shopkeepers to display their goods in electricity showrooms had proved valuable, and had convinced them of the value of good lighting.

Mr. H. Marryat (Messrs. Marryat & Place) said it was important to standardise the position of the filament in a lamp, because otherwise, if it were fitted into a standard reflector the focal distribution was upset.

Mr. H. T. Young (Messrs. Troughton & Young) advocated the policy of giving a shopkeeper a good installation on approval if necessary, because of its advertising value to the electrical industry. A shopkeeper generally kept such an installation, and paid for it.

Mr. H. G. W. Haslett referred to the difficulty arising through trying to fit a standard lamp to a fitting which was not standard, and urged co-operation between lamp and fitting makers.

The Chairman, who was asked whether the low consumption of lamps in this country as compared with others was the result of British lamps having a longer life, said that the British lamps were probably a little better than the best made in other countries, but, in view of the interchange of technical experience throughout the world, there would not be a great deal of difference in the future.

Mr. Bush, replying to the discussion, covered many of the points which he had dealt with in his reply on the previous evening. He agreed that development in the industry was going ahead faster than the education of the public, and suggested that the fault probably lay with the sales section of the industry.

New Electrical Devices, Fittings and Plant.

(Readers are invited to submit particulars of new or improved devices and apparatus.)

A Portable Electric Saw.

We have received some particulars of a new portable electric saw, manufactured by the Electro-Magnetic Tool Co., of America. The "Speedway" saw, fig. 1, weighs only 15 lb. and is equipped with a universal motor suitable for operating on either a.c. or d.c. supplies. It is fitted with a flexible cable and standard adaptor. It is claimed that the saw is capable

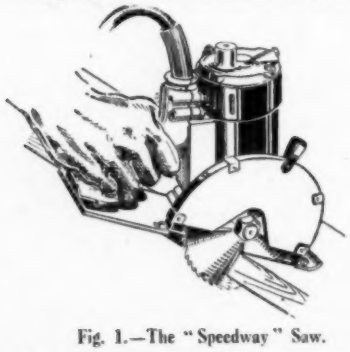


Fig. 1.—The "Speedway" Saw.

of being used for practically any work within the scope of a hand saw, and is equally effective in cutting bone, wall-board, plymetal, hard rubber, &c. A quick make-and-break trigger switch is located in the handle. The saw blade is adjustable by means of a single nut and is covered by a dust shield. The device is suitable for a 6-in. or 7-in. blade. Messrs. The B.E.M. Patents, Ltd., 100, Victoria Street, London, S.W.1, are the sole concessionnaires for the sale of this saw in Great Britain.

"Star of Eve" Reflectors.

This is a new range of reflectors for various purposes produced by Mr. E. Rutherford Palmer, 40½, Bristol Street, Birmingham. These reflectors consist of a body of heavy sheet metal lined inside with a fluted mirror split into sections to give a correct distribution. By the use of a special enamel the mirrors are rendered impervious to fresh or salt water; and the

Fig. 2.—Exterior Lighting Fitting.

fixing is such that a broken mirror can easily be replaced. The galleries, in the case of reflectors for interior lighting, are top-ventilated and made in two parts. This allows the body of the reflector to be fixed when the holder has been wired. With

Fig. 3.—Interior Lighting Fitting.

the exterior lighting units a trunnion arm is supplied (fig. 2) to enable the light to be directed as required. Fig. 3 illustrates an interior lighting reflector designed to take a 60-W lamp. The standard finish is black enamel, but a number of art enamel finishes are available.

An Improved Reducing Valve.

Messrs. The Steam Fittings Co., Ltd., West Drayton, Middlesex, have recently placed on the market an improved steam pressure reducing valve known as the H.M. steam relay type reducing valve, fig. 4, which is designed to reduce from variable boiler pressure, independent of variations in steam consumption, to a constant lower pressure. The valve has an adjustable operation which ensures a free and full lift. It is free, it is claimed, from shock and hammer action, and works equally well with saturated or superheated steam. It contains single seat main and auxiliary valve cones guided by means of a bush. A balancing piston in a cylinder is placed above the cones. A regulating and a safety valve are installed on the upper cover of the device, and its lower cover is fitted with a shut-off hand spindle. The regulating valve is under the control of a small diaphragm, the pressure on which is counteracted by a spring that is adjustable by a regulating screw and lock-nut. The high pressure steam reaches the chamber above the operating piston through the wall passage and the regulating valve (left). The piston loading pressure in the chamber, when the limit for which the spring pressure on the diaphragm is reached, lifts the diaphragm itself and the regulating valve so that, owing to the throttled admission, a constant loading pressure is maintained in the chamber. The loading pressure holds the operating piston down and therefore the main and auxiliary valve cones open until a pressure is reached on the low pressure side of the valve and therefore in the chamber below the operating piston, which very slightly exceeds the loading pressure above the piston. In consequence of the small difference in pressure on the two operating piston surfaces, the piston itself is lifted and the valve cone closes. The high pressure is thereby shut off from the chamber above the valve cone, so that the pressure in it drops to that prevailing in the low pressure space of the valve (exit) through the leakage space between the balancing piston and its guide cylinder. The main and auxiliary valve cones are now loaded by the high pressure from below and are moved in the closing direction.

If the steam consumption should be interrupted the high pressure will hold the main and auxiliary valves tightly closed so that the pressure on the reduced pressure side cannot creep up. During operation the low pressure, in consequence of the steam consumption, has a tendency to drop. With constant consumption the pressures above and below the main piston (top) become equalised and the main valve cone remains stationary. It is claimed that this reducing valve is suitable for all steam pressure reduction down to 15 lb. per sq. in., whether the ratio of reduction is large or small.

A Device for Hand Pump Conversion.

It is often desired to have a ready means of converting the ordinary domestic hand pump into an electrically driven pump in country houses where an electricity supply is available. To meet this requirement Mr. A. W. Reeves, 3, Edmund Street, Birmingham, has produced the device illustrated in fig. 5. The pump rod is operated by a concentric gear worm driven by an electric motor.

The normal speed of the pump is 70 strokes per min. and the motor may be switched straight on to the main. The mechanical efficiency is claimed to be very high, owing to the device being fitted with ball bearings, and the worm and the worm-wheel being cut with great precision. The diameter of

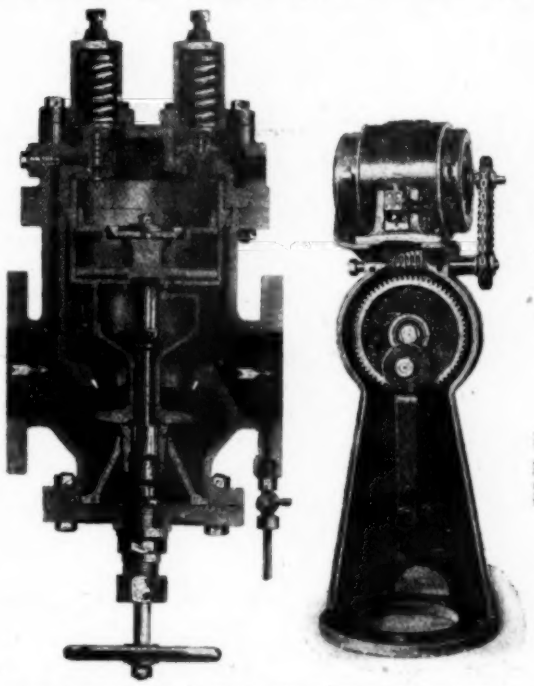


Fig. 4.—Relay Reducing Valve. Fig. 5.—Pump Conversion Device.

the base flange varies from 8 in. to 10 in. The method of attachment makes it possible to fix the device with its base flange at, or above the ground level, or in the event of the pump which it is desired to convert having an above ground delivery, the device can, of course, be fixed to suit this case.

In using the attachment the pump stroke is shortened by one half of that obtained when the pump is worked by hand, and the inertia forces become negligible. With an attachment 18 in. in height overall, it is claimed that 100 strokes per min. can be run with the stroke as short as 4 in.

Imagination in Engineering.

By FRANK J. MOFFETT.

(*Abstract of Chairman's Address*; South Midland Centre *of the* Institution of Electrical Engineers.)

Imagination is commonly associated in the mind of the man in the street with those possessed of an artistic talent—poets, painters, dramatists and such like. The engineer is not as a rule credited to the same extent with this power. He is considered to be a matter of fact, sensible sort of being with whom it is slightly absurd to associate any imaginative characteristics. I fancy that even engineers themselves are to a certain extent guilty of this attitude, and I trust that in the course of my remarks I may do something to modify it.

In the most general acceptation of the term, imagination may be defined to be the power or process of producing mental pictures or ideas. When the train of ideas simply reproduces the image or picture of past experience, or phenomena without any material alteration, the process is called "reproductive imagination"; When by a process of selective combination of ideas a new picture is produced we have creative imagination. Creative imagination is accompanied by many emotions—pleasure or pain, hope or depression. Anyone who has made even a minor discovery knows the fine glow of satisfaction which results from it, the joy of success or perhaps the dejection of failure. It is a well-known fact that many inventors in spite of continual failure to achieve success, refuse to be daunted and persist in their efforts, though these are unrewarded. An illustration of the power of thinking by analogy is the discovery of the Gothic style of architecture. We can imagine an architect setting out to find some improved design for the construction of churches and cathedrals and being struck by the resemblance of an avenue of trees meeting overhead to a beautiful roof. This I believe was the origin of the wonderful Gothic nave in some of our cathedrals. We all, I fancy, are in the habit of saying at times when faced by some knotty problem, that it is better to sleep on it. This means nothing but that we are deliberately giving the unconscious element an opportunity to come into action. I am so firm a believer in the value of the unconscious element that I much prefer when engaged on any specially difficult work, to call a halt for some few days and allow my mind to put in what I may call its automatic work.

In the realm of scientific discovery Michael Faraday stands out as one of the great figures, and it is very fitting to refer to his methods when addressing a gathering of electrical engineers; imagination played a great part in his achievements.

In a note on the margin of one of his papers he warned himself to be practical: "I must keep my researches really experimental and not let them deserve anywhere the character of hypothetical imaginations."

Tyndall in his address on "Faraday as a Discoverer" says: "When an experimental result was obtained by Faraday, it was instantly enlarged by his imagination. In virtue of the expansive power which his vivid imagination conferred upon him, he rose from the smallest beginnings to the grandest end." Faraday admitted that he was no lover of mathematics and pleaded almost pathetically in a letter to Clark Maxwell for some easier mode of expressing scientific ideas. I feel sure that many will sympathise with Faraday in his appeal. Surely many of the papers read before this Institution could with advantage leave out the pages of symbols and substitute, as Faraday says, common language.

In his aversion to the use of mathematical methods, Faraday is a striking contrast to Newton, whose great work in the discovery of the laws of motion and of gravity may, however, be said to be almost entirely the achievement of his wonderful mathematical imagination. In commerce again there is a great field for the imagination. In fact, the stories of the development of some of our great commercial enterprises read like romances. I consider that the greatest discovery Ford has made is the principle of service. I have referred to Faraday and Newton in scientific discovery and to Ford in commercial discovery. All of us, in whatever department of engineering we are engaged, require a creative imagination.

The layout of a power house and a system of distributive mains, the manufacture of machinery for the generation and transforming of electrical energy, the design of switchgear, the installation of electric power and light, the provision of telegraph, telephone, and wireless communication, the development of furnaces and welding appliances—all the wide range of constructive problems which confront the electrical engineer, involve the faculty of discovery and invention in a greater or less degree. The field open to the electrical engineer with creative imagination is enormous. Take the steam-driven generating station: it is well known to all that the overall efficiency from the heat energy in the fuel to the electrical energy at the switchboard is dismally low, not more than, say, 10 per cent. in the average station and 20 per cent. in the most recent super-station. Surely there must be some means of reducing this enormous waste of heat energy, from 80 per cent. to 90 per cent. of the total energy in the fuel. On a small scale a much higher overall efficiency has been obtained by the utilisation of the waste heat in the exhaust. No remedy, however, is yet forthcoming for the large station. The lead accumulator has held the field almost without threat of competition for the last 30 or 40 years. It is the weak link in any scheme which involves the storage of energy, since it has an extremely low capacity compared to its cost and weight, and its life even when treated with the utmost care is very short. The question of atomic energy may be looked upon as a subject which concerns the physicist rather than the electrical engineer, but at any moment it may become of vital importance to the latter. Shall we ever be able to tap this energy? Sir William Bragg says: "I am of opinion that atom energy will supply our future need. A thousand years may pass before we can harness the atom or to-morrow might see us with the reins in our hands. That is the peculiarity of physics—research and accidental discovery go hand in hand.

I have suggested one or two fields in electrical engineering where there is unbounded scope for the creative imagination, but I am sure everyone will agree that there is practically no limit to the number of scientific problems awaiting solution. Imagination is possessed in some degree by all normal persons. I would venture to claim that the average engineering designer's imaginative power is above the common level, but in view of the nature and scope of his work I consider that the development of this faculty has not kept pace with his technical powers.

In electrical apparatus in particular there appears to be a boundless field for imagination, especially in connection with appliances in which means have to be devised to circumvent the unconscious human tendency to commit suicide. The designer must, in fact, bring himself to realise that the desire to gratify the sense of touch has not yet been eliminated even in the trained electrical attendant. To still greater lengths must the use of the imagination be carried in the design of apparatus for domestic use. The designer must, by full use of his imaginative faculty, suppress for the time being the instincts of his training so as to adjust his focus to see, say, a griller switch through the eye of the average cook. In no sphere is the need for imaginative enterprise more immediately apparent than in industry where the search for an explanation of trade depression is engaging so many minds. Lack of imagination in catering for foreign needs and conditions may not be the principal course, but I suggest that it may be a strong contributory factor in the decline of overseas trade: the time has passed when our wares will sell on the strength of their place of origin. In the conduct of human relationships the necessity for what may be termed the sympathetic imagination is truly enormous. The relations between employers and employed are at the present time in a very strained condition. I suggest that one of the principal obstacles in the way of a solution of many of our difficulties is simply lack of imagination on both sides.

What are we doing to encourage the growth of the imagination? The child is father of the man, and we needs must start with the child.

Material, and it may be inspiration and encouragement, may be given, but the inventive mind can only work when free and untrammelled. The course of the school is obvious. In all constructive work it should leave as free a hand as possible in the planning: should welcome originality even if it spoil material and should give to those who show they can imagine new constructions, generous opportunity to carry out their practical ideals. In the majority of public schools the zeal for sport of every kind is tremendous. Is it not possible to awaken similar zeal for the pursuit of knowledge?

As a final word I would say that imagination is one of the greatest faculties with which we are endowed. If we give full scope for its exercise and have the courage to follow its lead we shall have added power to deal not only with the technical problems which confront us as engineers, but also with the wider problems of human relationships to the solution of which engineers can make valuable contributions.

The Supply of Electricity by the Gas Industry.

Some Statistics, and a Gas Engineer's Opinions.

In his presidential address to the Scottish Junior Gas Association (Western District), on October 10th, as reported in the *Gas World*, Mr. Robert Gray, assistant manager, Hamilton, said that within recent months they had read and heard a great deal regarding the development of the electrical industry; greater prominence had been given to this industry within very recent times than they had before experienced in its whole history. The quantity of coal consumed in the generation of electricity in this country was about 7,500,000 tons per annum, or about 4.5 per cent. of the total coal consumption of Great Britain. It was an admitted fact, however, that less than 20 per cent. of this amount was converted into electrical energy. Not only was our coal being destroyed, but valuable by-products were being thrown away. About two million tons of coke, 60 thousand tons of sulphate of ammonia, and 60 million gallons of tar could be recovered from this quantity of coal, not mentioning the tremendous volume of gas which could be recovered and converted to useful purposes. He would not, in the slightest degree, attempt to belittle the necessity of an electrical industry in this country, as he knew it to be absolutely essential. There were purposes to which electricity could be better applied than could any other power; the gas industry made use of it for such purposes. The objection to the proposed development was that it was to be carried out at the nation's expense. Surely the electrical industry was capable of its own development, and quite independent of State subsidy.

As shown by the Board of Trade returns, the gas industry carbonised just over 17,300,000 tons of coal last year, or a little more than 10 per cent. of the total coal consumption of Great Britain. In 1924, 237,000 tons less were carbonised than in 1920, and yet the quantity of gas produced was over 17,000 million cu. ft. more than in 1920—an increased production of gas from a decreased quantity of coal. Last year the gas industry recovered from the quantity of coal carbonised and placed at the nation's disposal 11,600,000 tons of coke, 124,700 tons of ammonium sulphate, and 195 million gallons of tar. Of the total coal consumption of Great Britain, the gas industry could claim to treat its portion more scientifically and, at the same time, more efficiently than any other consumer of coal.

The president believed the future of low-temperature carbonisation would be very bright. It might not be a commercial proposition at the moment, but the future would bring this to success upon a large scale process. It was a process which extended very great possibilities; not only did it offer a solid smokeless fuel, but very large quantities of fuel oil. Our wealth of coal, if scientifically treated, would yield more fuel oil than was necessary to meet our requirements. Low-temperature carbonisation was a small-scale process at present, but would yet become one of the most essential and most important industries in this country.

The gas industry could not stand aloof from the low-temperature carbonising process, but must assist in the preliminary work necessary for ultimate success. Low-temperature carbonisation opened out a new field of products almost distinct from those derived from the high-temperature process. A market must necessarily be found for the solid product, but was there not a tremendous problem awaiting solution in atmospheric purification? This could only be overcome, and permanently solved, by the enforced use of smokeless fuel for industrial and domestic purposes. In low-temperature carbonisation he foresaw a great industry.

A point worthy of great consideration was that of the generation and supply of electricity by gas undertakings. Within recent months many gas undertakings had applied for and obtained powers to generate and supply electricity. This was not altogether unusual, as the number of gas undertakings which were also supplying electricity had increased fairly rapidly within recent times. Had they to take it that this was to be a new branch of the gas industry? Was it possible that the present gas industry might yet become the electrical industry? Would the two competitive industries become one great combine for the supply of light, heat, and power, in the form of gas and electrical current? Was it possible to imagine such a combination of industries? The president believed that it was not impossible.

The generation of electricity by means of the consumption of raw coal without the recovery of residual products was wasteful, and did not coincide with the present age of science. It might be argued that the electrical industry could put down plant for the scientific treatment of coal coinciding with the generation of electricity. This was to be admitted as being quite possible—but why duplicate the coal-carbonising plants of the country? Would it not involve ruthless capital expenditure? Must the nation's wealth, in coal and money, be sacrificed and squandered simply for the purpose of preserving one industry's dignity against another?

It was possible for the gas industry to generate electricity by one or by a combination of methods, whichever might be decided upon as being most adaptable to the existing conditions. In many gas undertakings there was a quantity of surplus heat available which could be utilised for steam-raising purposes, and the steam in turn could be used as power for generating sets. Again, it was possible, with carbonising plant available, to carbonise coal slack for the production of low-grade coke and breeze for steam-raising purposes, the steam being utilised as before for generating sets.

It might be said that the surplus heat available would be unable to generate sufficient steam for the desired purpose. This might be so in certain instances, but it would always be possible to have gas-driven generators as auxiliary plant, so that these could be brought into operation when the load was greater than the output of the steam generating sets.

With the introduction of low-temperature carbonisation and smokeless fuel plants it was probable that greater possibilities for the generation of electricity by gas undertakings might become obvious. Where the smokeless fuel plant gave a gas of low calorific value the gas could be utilised for steam-raising purposes. In the case of plants giving a high-grade gas this could be used for driving large gas engines for the purpose of generating electric current.

The coming of the gas turbine was still delayed, but the president believed the present difficulties would eventually be overcome and that the gas turbine would displace less efficient machinery now in use. With the coming of the gas turbine there would open out to the gas industry an entirely new field, whereby the industries of the country would benefit to a very great extent. At present they had no high-speed gas-driven machine to compare with the steam turbine, but he hoped that the future would bring a gas-driven machine as efficient and economical as the steam turbine.

It might be asked: "What advantages are to be gained when gas and electricity are supplied by the same undertaking?" He believed the advantages to be many, although there were at the same time disadvantages set up in such cases. Probably the greatest advantage was that the work of the joint undertaking would be more economical and more efficient than two separate undertakings. It would be possible for a gas undertaking to generate electricity by a variety of methods, whereas in the electrical industry, at present, they were bound down almost entirely to one method, and that was admittedly very wasteful and inefficient. In a joint undertaking for the generation and supply of gas and electricity it would be possible by one, or by a combination of methods, to generate and supply electricity more efficiently and more economically. Not only would this be so from a national viewpoint, but also from that of the consumer.

It had been suggested by a committee over which Mr. Lloyd George presided that it would raise the efficiency of electricity production if the coal was subjected to carbonisation previous to being used for steam production. Was not that the everyday practice of the gas industry? Why should it be necessary to set up new coal carbonising plants for the production of electrical current when plants were already in existence all over the country? Many electrical undertakings were realising the value of one of the principal products of the gas industry, and utilising it for the production of steam. Large quantities of coke produced by the gas industry were being consumed annually by the electrical industry for steam-raising purposes. Was not this a sign of the times? The president believed it marked a further stage in the gas industry.

Apart from the advantages to be derived by the nation from the combined industry, he believed the consumer would benefit to a very great extent. In some parts of the country at present they had competition between the two industries which certainly amounted to rivalry. This was quite unnecessary. Was there not a tremendous field and a great future for both gas and electricity? At present both industries were advocating their products as being more efficient and more economical than the other for every purpose, and it was in such instances that he believed the consumers did not receive the service which could be provided by a combined industry. Gas and electricity had each their fields, in which one was of greater service to the consumer than the other. Each had its purposes to which it could be best applied, but at present they were not always being applied to their best purposes. Gas and electricity were not both best for the same purpose, but that was as they had it to-day, with the result that the consumers did not receive the proper service from either industry. A combined industry would give the consumers a service which at present was not obtainable. Gas and electricity would be applied to the uses and purposes of the consumers to which they were best suited. Those in authority in both industries knew the limits to which their products might be best applied in the form of light, heat, and power, but as long as the industries were separate those limits would be over-reached, to the consumers' loss.

In answer to the question: "Do you think gas a thing of the past?" the president said he utterly failed to understand why anyone should ask such a question. The total quantity of gas sold last year (1924) showed an increase of more than 15,000 million cu. ft. over 1923, and almost 21,500 million cu. ft. more than the quantity sold in 1920. Compared with 1923, the quantity of gas consumed for street lighting last year increased by 637 million cu. ft.—greater than the quantity in 1920 by almost 2,700 million cu. ft. Last year 183,000 more people realised and secured the services of gas, and since 1920 the number of gas consumers had increased by more than half a million. The future extended great progress and prosperity to the gas industry—greater progress and prosperity than it had yet experienced.

Correspondence.

Correspondents should forward their communications **at the earliest possible moment.** *No letter can be published unless we have the writer's name and address in our possession.*

Is the Contracting Business Degenerating?

The letter from the "Hard-Working Ex-Service Electrical Contractor" comes as a little additional recreation for the "sit-at-home" contractor to ponder over during a few of the leisure moments of which he has such a surplus.

One feels that the arguments or contentions would be better supported if his (the hard-working gentleman's) earnings could not exceed, say, 12s. per day. Why does he not get busy and find men to work for him who may possibly earn, say, 16s. per day! Look at the enormous profit he would make by joining the happy band of "sit-at-homes" in such a case. He would find it all so easy.

Another little point, on this gentleman's own showing, is that his customers (or his portion of the "British public") appear to be paying at least 12s. 6d. for not more than ten shillings' worth of value in his work.

There is, however, a serious side, and we owe this hard-working gentleman some slight thanks for this publicity. It must be perfectly obvious that if this gentleman can earn 25s. per day by doing work at 10s. 6d. per point, any contractor would be able to do such work at such a price (and even pay his men above the standard rate) and still make a substantial amount to cover his overhead expenses and allow for profit. Also, we imagine, the average builder or house owner would (prices being equal) prefer to place his work with a person or firm of some substance and standing, rather than with a purely one-man firm which generally works with such a stock as is easily movable and kept in his own backyard, and does the accounts at night.

Of course, the letter is only alluding to the little cheap house jobs which are about at present. On large contract work the one-man concern would never be entertained for a moment. On the whole, the one-man concern lowers the standard of work and does considerable harm to the electrical trade. Our hard-working friend will, we hope, be an exception, but he will know, as well as most of us, that a lot in his letter is sheer nonsense.

C. J. B. Barlow.

Warrington, *October 21st*, 1925.

Two-way Pendant Switch Flexibles.

Under the pen name of "Safety First," we had occasion some two years ago to refer to ignition caused by electrical stress across the insulation of the cores of two-way flexibles, of which we have experienced no fewer than seven instances, all occurring in periods of exceptional humidity.

Our explanation was coldly received by some manufacturers, and misunderstood or denied by others.

During the past two days the condition of extreme humidity has again given rise to further outbreaks of this dangerous nature. There is still no 2-way ratchet action ceiling switch on the market.

We have reason to believe that such a switch would meet the approval of contractors throughout the world. That, however, would appear to be a matter of little importance to British manufacturers.

Does anyone know of a foreign source of supply for these long overdue necessities?

For **Teesdale & Jones.**

W. I. Jones.

Swindon, *October 22nd*, 1925.

Motor Converters v. Rotary Converters.

It is now becoming a matter of frequent occurrence in specifications that motor converters are being called for in cases where rotary converters would obviously be a far more economical proposition and, to all appearance, entirely satisfy the technical requirements.

Although the fashion of the moment in the matter of equipments seems often to play a rather important part in the preparation of specifications, it is hardly credible that a type of plant should be reverted to, which was admittedly evolved to meet conditions of other days. At the present time such a high degree of efficiency and reliability has been reached with rotary converters that hardly a case remains in practice where these machines cannot be used with advantage in preference to motor converters. At the same time, there is no longer any essential point in which motor converters can be regarded as superior to rotary converters. A review of the principal claims put forward in favour of motor converters will make this perfectly patent; these claims can be summarised as follows:—

1. Possibility of connecting the plant direct to the high-pressure supply without transformer, up to 11,000 volts.
2. Simple starting up and nearly immediate synchronising.
3. High efficiency and possibility of maintaining a power factor always in the neighbourhood of unity.
4. Large range of regulation on the d.c. side.
5. Perfect balancing in the case of three-wire systems.
6. Low peripheral speed.
7. Safe operation without highly-trained staff.

Let us now consider these claims one by one and see wherein they differ from those which can be brought forward for rotary converters, or how far they represent practical advantages over rotary converters.

1. The advantage is here on the side of the rotary converter, as the fact that this plant requires a transformer means that the high-pressure windings are immersed in oil, and consequently more reliable than the best designed high-pressure windings of the motor. Furthermore, the transformer acts as a choking coil in case of resonance or similar troubles. On the other hand, the repairs can be carried out more easily than in a motor, in the event of a breakdown of insulation.
2. There is no difference as compared with a rotary converter, which is quite as simple to start up and synchronise as a motor converter.
3. The efficiency of a rotary converter, including the transformer, is higher than that of a motor converter, as on the one hand the efficiency of the transformer is considerably higher than that of the best three-phase induction motor, and, on the other hand, the efficiency of the rotary converter is higher than that of the generator of a motor converter.

   In the case of a 1,000-kW equipment, for instance, the efficiencies would be as follows:—

Transformer	about 98.6 per cent.
Rotary converter ...	about 95 per cent. at full load
Total efficiency	about 94 per cent.

   If we further include 1 per cent. for the series reactances, we arrive at about 93 per cent.

   In the case of a motor converter, the efficiencies would be under the most favourable conditions, as given below:—

Motor	about 95 per cent.
Generator	about 94 per cent.
Total efficiency.	about 89.5 per cent.

   With larger sets the gain in efficiency secured through the use of rotary converters is still greater.

   The power factor of rotary converters, on the other hand, is also approximately unity or leading.
4. The range of regulation of motor converters is actually larger in view of the fact that the d.c. machine works partly as a generator. In the case of a set where the number of poles of the three-phase induction motor and of the d.c. machine are the same, so that the latter works half as a generator, the range is about double that of a rotary converter; this seeming disadvantage can, however, easily be compensated for by making use of an induction regulator, by means of which it is possible to deal not only with the regulation on the d.c. side, but also with the large fluctuations liable to occur on the a.c. side. The efficiency of the rotary converter, including the induction regulator, is, even then, higher than that of the motor converter.
5. There is no difference here between a rotary converter and a motor converter, with regard to the balancing of three-wire systems.
6. The small reduction in peripheral speed, in the case of motor converters, is obtained at the expense of the size and price of machine. At the present day, when commutator and brush design has reached such a degree of perfection, small differences in peripheral speed are of no consequence. As regards noise, it is possible with the peripheral speeds adopted at the present day for rotary converters, to build machines practically noiseless in operation. It may be said, in this connection, that a machine, although it may have a peripheral speed of only 25 metres per sec., may be more noisy than another machine with 35 metres per sec., if not properly designed.
7. The operation of a rotary converter is as simple as that of a motor converter, while the fact that the high-pressure winding is in the transformer is an important advantage of the rotary converter.

   The rotary converter is, on the other hand, much simpler than the motor converter as regards design. In the case of the latter plant, for instance, the leads connecting the two rotor windings have to be led through the hollow shaft and middle bearing, this being a rather weak point from a constructional point of view.

   It may be added that a better utilisation of the space available is possible with rotary converter equipments as the position of the transformer can be chosen independently of that of the rotary converter. This is a considerable advantage seeing that converting plant is usually installed in large centres where floor space is very costly.

   As regards the plea that motor converters are more reliable owing to their lower speed, this can hardly be taken seriously, as experience has shown that 50-cycle rotary converters could be built for a speed of 1,500 r.p.m., with every guarantee of reliability in service, for pressures as high as 1,500 volts.

The mere fact that so few makers of electrical machinery have taken up the construction of motor converters is, in the writer's opinion, a clear indication that the advantages of rotary converters over motor converters are generally recognised; it is, however, quite comprehensible that those who have been unable to produce 50-cycle rotary converters operating satisfactorily from a commutation point of view, should encourage the present fad for motor converters, but the purchaser cannot fail to appreciate that, in view of the limited number of manufacturers of motor converters, the cost of this type of plant, already so disproportionally high as compared with that of rotary converters, will tend to ascend still further.

G. Wüthrich, M.I.E.E.

London, *October 24th*, 1925.

Firemen's Risks.

Your leader on the above subject draws attention to an important point in connection with wiring, not only from the point of view of fatal shocks, but also that of electrically-caused fires.

There is no doubt in my mind that slip conduit wiring, especially as found in City premises, is a frequent cause of fires. When installed in private suburban houses it forms a reasonably safe installation, because there is generally room to isolate it from other metal work. But in City premises, as all wiring contractors know, it is invariably jumbled up with a mass of lead-covered telephone lines, gas and water pipes, screwed electrical conduit, &c., all forming, more or less, good earths. Of course, as you remark, "everything depends upon the honesty and skill of the workman," and a badly-erected "screwed" or "grip fitting" installation is as much a source of danger as any other, but the point is that even the best workman cannot make an electrically sound job of a "slip conduit" system.

It seems to me that the various electrical supply authorities possess the power to raise the standard of wiring. Any company which adopts the I.E.E. rules, and an increasing number are adopting them, must refuse to connect any "slip" conduit wiring, and this in course of time will tend to eliminate it.

Your point about cutting off the supply, as the fire brigades do with gas, was mentioned to a fire officer during the case in question, who pointed out that in large buildings they are often glad of the light to see their way about. If it is decided that it is safer to cut off the supply, then the main switch should be *outside* the building.

A. Roberts,
City Electrical Engineer.

Guildhall, London, *October 20th*, 1925.

Broadcasting Power.

I would not trouble to reply to Mr. Amphlett's somewhat bombastic letter did I not realise, he has already addressed me personally, that he is at least enthusiastic. It is his remark concerning the bankruptcy of science that intrigues me.

Science is not bankrupt; it is those persons who refuse to use their imagination and who devote their lives to events of historical interest who are responsible for the fact that amateurs succeed where professionals fail.

Your correspondent refers to the fact that of the energy put into broadcasting, not one thousand-millionth part is usefully employed. Quite so. Does he seriously imagine that in a few centuries' time—not a long period other than relative to our short lives—the only changes that will take place in wireless will be in the colour of the knobs employed on receiving sets? Does he think that the scientist of the future will be content with such wastage?

Does Mr. Amphlett realise that thirty years ago to send a message one mile by radio was an achievement, and that at that period Sir William Preece wrote of Marconi's experiments that "Radio would never be of commercial value"?

It is only about three centuries ago that a judge and jury in England killed old ladies, on the evidence of children that they were witches and that they employed familiar imps to do their bidding. Our knowledge of radio to-day is on a par with that period. Is it not honest to admit it? I tremble to think what

Mr. Amphlett's grandfather would have said if he had been told that in 1925 one would be able to fly across the Atlantic and speak to one's house *en route*! ! !

The experiment referred to by Mr. Amphlett is not the only one. Tesla's experiments are interesting, as are those of many others who realise that we who live to-day will be cave men in the light of the knowledge of 3,000 A.D.

To take a case of which I have personal knowledge, I might point out that in the early days of photo transmission by radio and of radio television, many of the greatest experts said that results were impossible and the suggestion was attributable to a madman's dream.

I merely expressed a courteous opinion of what might happen in perhaps a thousand years' time. Your correspondent, less politely, refers to Senator Marconi's sarcasm. It might interest him to know that Marconi *does* believe in the possibilities I stated. We should surely remember that if many learned people are of opinion that even spirits can be seen, he should refrain, in my humble opinion, from denying every possibility that he himself cannot visualise.

The possibility of to-day is the probability of to-morrow. Nothing is so difficult to define as the impossible.

A. M. Low, A.C.G.I., &c.

London, *October 18th*, 1925.

The Æsthetic Aspect of Advertising.

The letter of "Advertiser," of Liverpool, in reply to my Æsthetic Parable raises such an interesting point that I feel like asking the Editors to grant me half-a-dozen pages in which to reply. However, as such a course would probably rouse a howl of protest from the electrical industry in general, I will encroach upon the pages of the REVIEW as little as possible, and endeavour to be concise.

Briefly, then, my letter was correctly described by its title. It dealt with the æsthetic aspect of advertising. "Advertiser's" letter raises quite a different question; I do not think I shall be unfair to him if I word it thus: Is not even artistically bad advertising better than none at all?

To this I reply, certainly it is; and I invite "Advertiser" to consider with me, starting from this basis of common agreement, whether æsthetically good advertising is not better than æsthetically bad advertising. My letter was an expression of my views on this point, which, speaking generally, are that artistically bad advertisements either cancel out or provoke only disgust. It is not sufficient to attract attention: disgust is a form of attention. But I have never heard anyone advocate the selling value of disgust!

I am sorry if my purely artistic criticism has been taken as reflecting in any way on the work of those who laboured to build up "Advertiser's" statue of Truth, and to deserve the noble words which he gives as their epitaph. Their problem was to create a good name by giving honest value, and this object and the sacrifices they made to gain it, were alike noble. I join with "Advertiser" in revering their memory. But may I point out that the problem of the modern advertiser is quite different? Advertising is now established. It has grown, and is now risen to the dignity of employing artistic means to accomplish its ends. That this is so is recognised at least by those who set the competition which is running in the pages of the REVIEW. The four points upon which entries will be judged are all artistic; *i.e.*, they are secured by employing artistic means. And in so far as any advertisement claims to use artistic means, it is open to artistic criticism.

May I put before your correspondent a consideration rather more general than even the above? The use of trade marks, business names, advertising, &c., was a great reform. It served its purpose of preventing, to a great extent, fraudulent manufacture. But, as businesses have enlarged, and have entered more into the life of the Empire, so advertising has enlarged. It is a growing thing, and it is the nature of growing things to require direction and pruning. They must be checked here, and encouraged there. They are at all times liable to irregular growth, abuse, and deterioration. And it very often happens that those who have grown up with any particular reform from the outset, are unable, because of the tyranny which preconceived ideas exercise over all of us, to perceive where the reform is tending, and what are its defects of growth. It is here that outside criticism can be most valuable. The very fact that advertising is capable of provoking æsthetic criticism is evidence of a state of healthy growth.

As my artistic criticisms have not been questioned by "Advertiser," it is not necessary for me to defend them. My ideal REVIEW, from the standpoint of good advertising, would be one containing such attractive advertisements that readers would be unable to tear themselves away so much as to look at the letterpress. May the efforts called forth by the REVIEW competition hasten such a happy result!

B. Twigg.

Great Malvern, *October 18th*, 1925.

The Manufacture of Alternating-Current Motors.

As I am interested in the publicity methods criticised in the last paragraph of Mr. F. Parkinson's letter in your issue of the 23rd inst., may I assure Mr. Parkinson that the adoption of a distinguishing name is quite dignified, legitimate, and sound publicity. Notwithstanding Mr. Parkinson's disapproval, the treatment is being shared by very good company in engineering advertisements.

That engineering products *do* lend themselves to the adoption of a trade name is corroborated by the success of the policy in this case, a success which is emphasised in the thinly-veiled chagrin apparent in Mr. Parkinson's remarks. That he should publicly disparage his competitor's publicity policy is a good indication that the policy is effective.

D. Ross Kennedy.

Denton, Manchester, *October 24th*, 1925.

Legal.

American-German "Bosch" Litigation.

IN the Chancery Division on October 22nd, Mr. Justice Astbury commenced the trial of a case which was in the nature of an appeal from a decision of the Registrar of Trade Marks, allowing the word "Bosch" to be registered in respect of magnetos and sparking plugs. The applicants for registration were a German company, the Robert Bosch, A.G., and the application was opposed by the American Bosch Magneto Corporation.

Sir Arthur Colefax, K.C., and Mr. Moritz, K.C., appeared for the American company, the appellants and opponents, and Sir Duncan Kerly, K.C., Mr. Sebastian and Mr. Bray, for the respondents and applicants.

SIR A. COLEFAX said that the German company applied for the registration of two marks—the word "Bosch" in both cases—in respect of (1) magnetos, charging dynamos, and electrical self-starters, all for use with internal combustion engines; and (2) sparking plugs. Each application was dated September 11th, 1923. The application was made under Section 9, Sub-section 5, of the 1905 Act as amended by the 1919 Act, which provided that a mark should not be registrable except on evidence of distinctiveness, and "distinctive" meant "adapted to distinguish the goods of the applicants from those of other persons." The name "Bosch" was a surname which was not readily registered so far as our courts were concerned. The applicants carried on business at Stuttgart and they said that the word "Bosch" was their most important trade mark and had been used in Great Britain continuously since 1906. The applicants also said that the word had been regarded since 1906 by their customers as their trade mark designating their goods, and it was recognised as exclusively applied to their goods. They further said they had spent thousands of pounds in making the goods known; that their opponents never used the word "Bosch" as their trade mark, and were only a concern with a place of business here having "Bosch" as part of their name; and that the use by any other person would tend to confusion. The opponents, on the other hand, said that the word was not and could not be distinctive of the products of the applicants and was calculated to deceive for the reason that the word "Bosch," which formed part of the corporate title of the opponents, had been used by them for many years past in the United Kingdom. The opponents, continued Counsel, were incorporated in the United States in 1919 and they acquired the stock, patents, patent applications, and goodwill of an American company—the Bosch Magneto Co. (Inc.), which was formed in 1906 and had acquired certain rights from Robert Bosch. It appeared from an affidavit filed on behalf of the applicants that Robert Bosch started business in 1886 and in 1896 the individual business became a firm's business and the applicants themselves were incorporated in 1917 in Germany. Opponents' case was that the word "Bosch," whatever its meaning was in this country at the outbreak of war, ceased in the war to distinguish or to be capable of distinguishing the German-made goods: the word was applied here, equally to any surviving German goods, any American goods, and any English goods, more especially magnetos. Since the war ended "Bosch" had been applied as largely to American-made products as to German-made products here. Further, there was an enormous business in the United States in American-made products with which the applicants had nothing whatever to do. From 1914 to 1920 the German-made goods were not coming to this country, but since 1920 the applicants' conduct showed that the word did not distinguish their goods: their conduct amounted to an abandonment of any right—if they had any—in the word "Bosch." "Bosch" to-day meant a type of magneto, and that type was made in Germany and elsewhere, notably in the United States. Another consideration for the Court was this, that if this registration were to be allowed, they would have this position: there were and had been for a very considerable number of years thousands of American cars coming into this country which had got as part of their standard equipment, some product of the American company marked "Bosch" with a perfectly clear indication of American origin. The Bosch Magneto Company (Inc.), the predecessor of the opponents, was in existence when the war broke out in America and went on until May, 1918, when the Custodian of Enemy Property in the United States took possession of the property of that company, which was a German company in America, and was substantially owned by Robert Bosch. The company remained in the Custodian's possession and was carried on for a few months, until October, 1918, when its property was sold to the present opponents. In 1898 a Mr. Sims was appointed

the selling agent for Robert Bosch, then carrying on business at Stuttgart, and in 1907 Bosch acquired from Sims the Sims-Bosch Magneto Department of the Sims Manufacturing Company. In 1907, Bosch appointed that company selling agents, the name was changed in 1908 to the Bosch Magneto Company, Ltd., and that company was in existence at the outbreak of war here. In 1916 or 1917, the Custodian of Enemy Property here seized the business after it had been carried on by the Ministry of Munitions, and ultimately, in 1917, Messrs. Vickers purchased the assets and formed the British Lighting and Ignition Company.

His LORDSHIP: The English company was originally a German Bosch company?

SIR A. COLEFAX: Unquestionably; at the outbreak of war substantially all the shares were owned by Robert Bosch. The English company up to the outbreak of war imported from Germany. In America he thought the business was in American-made goods; in England the business was undoubtedly in German-made goods. He understood that from 1906 to 1911 the magnetos were not manufactured in the United States; the American company was selling Stuttgart-made magnetos. In 1911 the parts were imported and the assembling was done in America. In that year the American company acquired a site and erected the Springfield factory, which was planned to produce 100,000 magnetos a year. They commenced to manufacture in 1912 and by the end of 1915 all parts with quite unimportant exceptions were made in the United States at this factory and sold as Bosch magnetos with the country of origin plainly stated.

Counsel went on to say that in this case there was a gentleman named Heins, who formed with one named Clyne the original American company, and there was no question that there was always a close association between Heins and Robert Bosch. There had been started two actions in the United States, claiming in substance that the American Bosch Magneto Corporation was not the successor of the American company and had no right to the goodwill, &c., of that company. One of those cases had been dismissed for want of prosecution and the other for five years had never been brought to issue. On the other hand, Heins had, since this application was launched, registered in America the Robert Bosch Magneto Co. (Inc.), and the present opponents, the American Bosch Magneto Corporation, had started an action against him and that company in respect of that registration.

The hearing was adjourned.

Fox v. A. Jurd & Co.

IN the Shoreditch County Court of October 22nd, before Judge Cluer, Isaac Fox, Clapton, E., sued A. Jurd & Co., Heatherley Place, N., to recover £13 5s., being the value of a radio set (£10), and the cost of repairs (£3 5s.). It was stated for plaintiff that he purchased the set in 1923, but finding something wrong with it took it to the defendants, who agreed to put it right for the sum named. The set was repaired but as it was still unsatisfactory the plaintiff took it back. On the following day a fire occurred at the defendants' premises and the set was destroyed. The Judge pointed out that the plaintiff would have to prove negligence on the part of the defendants; he should have insured the set himself. The plaintiff produced a note from the defendants showing that the set was guaranteed for a period of 12 months from mechanical defects, but the Judge said that the defendants had taken the set back to repair the defects and it had not been proved that the fire was due to their negligence. He accordingly gave judgment for the defendants, with costs.

First Unlicensed Radio Set Prosecutions.

ON October 23rd, at the South London Police Court, Mr. Ratcliffe Cousins had before him the first prosecution under the recently-amended Wireless Telegraphy Act of 1904, of a person using a radio receiving set without having obtained the necessary licence. Counsel for the Post Office said that although the penalty on summary conviction was £10 and on indictment £100 or two months' imprisonment, they had no desire in the circumstances for a heavy penalty.

The defendant, H. Hazlewood, a wheelwright, living at Battersea, admitted the offence. The magistrate bound over the defendant in £5 under the Probation of Offenders' Act for six months.

In a similar case at the West London Police Court on October 26th, the summons was dismissed under the Probation of Offenders' Act upon payment by the defendant of 4s. costs.

Radio Instruments, Ltd., v. Charles & Co.

As reported in our last issue (p. 654), Mr. Justice Astbury granted an *ex parte* interlocutory injunction on October 13th restraining the defendants from selling the plaintiffs' radio transformers at less than the stipulated price. On October 20th the defendant appeared in Court and consented to a perpetual injunction, agreeing to pay the costs.

Marconi's Wireless Telegraph Co., Ltd., v. Fada Radio, Ltd.

IN the Chancery Division, before Mr. Justice Astbury, on October 23rd, Mr. Whitehead, K.C., mentioned this case and said that he had a motion for an injunction. The action was a patent action and related to the plaintiffs' grid leak patent. He had agreed with Mr. Stafford Cripps, for the defendants, to the following terms:—The defendants would undertake to pay into Court within seven days the sum of £500 as security for costs and damages and would undertake to keep an account on these undertakings there would be no order on the motion except that the costs would be costs in the action.

His LORDSHIP assented to these terms.

Trade-mark Applications.

THE following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from October 21st:—

B.B.C. (lettering and design). No. 449,385. Class 8. Apparatus for use in radio-telegraphy and telephony.—British Broadcasting Co., Ltd.

Davreach. No. 461,692. Class 8. Radio-telephonic apparatus.—E. H. Millington, 5, Vaughan Street South, Birmingham.

Hyten. No. 462,173; and Hymeg. No. 462,174. Class 8. Electric storage batteries and accumulators.—The Edison Swan Electric Co., Ltd.

Stethophone. No. 461,616. Class 11. Instruments, apparatus, and contrivances for surgical and curative purposes.—Western Electric Co., Ltd.

Published Specifications.

Compiled expressly for this journal by Patent Agents.
The name of the applicant's patent agent, if any, will be found on the printed specification.
The numbers in parentheses are those under which the specifications will be printed and abridged, and all subsequent proceedings will be taken.

1924.

13,179. "Electrical cooking apparatus." J. Gogan. May 29th, 1924. (240,509.)

13,182. "Thermionic valve circuits." J. H. T. Roberts. May 29th, 1924. (Cognate application 22,456/25.) (Divided application on 13,182/24.) (240,510.)

15,670. "Dynamo-electric machines." British Thomson-Houston Co., Ltd., and F. P. Whitaker. June 30th, 1924. (240,524.)

15,706. "Electric power supply systems." M. B. Bean and W. I. S. Price. June 30th, 1924. (240,526.)

15,712. "Telephone receiver." W. Dubilier. June 30th, 1924. (240,528.)

15,811. "Wireless telegraph receiving systems." Marconi's Wireless Telegraph Co., Ltd., and J. Brown. July 1st, 1924. (Addition to 199,671) (240,534.)

16,117. "Coiling machines for wire." British Thomson-Houston Co., Ltd. July 6th, 1923. (218,674.)

16,134. "Variable inductances." N. H. Clough. July 4th, 1924. (240,553.)

16,194. "Winding machines, particularly for coils of wire." Sir H. C. Holden. July 5th, 1924. (240,557.)

16,198. "Electrical switchgear." D. R. Davies and Metropolitan-Vickers Electrical Co., Ltd. July 5th, 1924. (240,558.)

16,246. "Electrical inductance coils." E. W. Kirk. July 7th, 1924. (240,559.)

16,276. "Activated material for electron-emission purposes." A. S. Cachemaille (Westinghouse Lamp Co.). July 7th, 1924. (240,560.)

16,615. "Illuminated appliances." W. A. Dorey. July 10th, 1924. (240,569.)

16,794. "Method of and apparatus for the production of radio-waves." S. Japolsky (A. Seleznev) (in part). July 12th, 1924. (240,572.)

16,865. "Safety device for use with portable electrically-operated machines." E. E. Grover. July 14th, 1924. (240,574.)

18,398. "Electrical condensers." G. F. A. Stone. August 1st, 1924. (240,591.)

18,956. "Acoustic devices." Western Electric Co., Ltd. (Western Electric Co. Inc.). August 9th, 1924. (Patent of addition not granted.) (240,596.)

19,619. "Automatic and semi-automatic telephone systems." Western Electric Co., Ltd. (Western Electric Co. Inc.). August 19th, 1924. (240,605.)

19,641. "Method of and means for preventing unauthorised use of thermionic valves before sale." W. R. Bullimore. August 19th, 1924. (240,606.)

20,076. "Electrolytic manufacture of dental plates." E. E. B. Weigele and E. Jansz. August 25th, 1924. (240,610.)

20,878. "Visual system for testing telephone receivers." C. E. Brigham. June 16th, 1924. (235,512.)

21,761. "Telephone systems." Automatic Telephone Manufacturing Co., Ltd. February 25th, 1924. (230,006.)

21,911. "Carriers for accumulators and the like." E. B. West. September 17th, 1924. (Patent of addition not granted.) (240,626.)

22,189. "Thermionic tubes." Dr. E. F. Huth Ges. April 11th, 1924. (232,159.)

22,218. "Apparatus for testing telephone receivers." W. H. Gerns. June 21st, 1924. (235,831.)

23,837. "Solenoid for operating electric contacts." British Thomson-Houston Co., Ltd. October 8th, 1923. (223,236.)

24,073. "Surface wiring for electricity distributing systems." Macintosh Cable Co., Ltd., and T. H. M. Harvey. October 10th, 1924. (Cognate application 25,375/24.) (240,649.)

24,662. "Electric circuits of switchboards adapted for charging accumulators." P. J. Gates. October 17th, 1924. (240,658.)

25,345. "Portable electric lamps." J. E. Flesher and E. J. Bangerter. October 24th, 1924. (240,660.)

26,938. "Thermionic tubes." Deutsche Glühfadenfabrik R. Kurtz und Dr. Ing. P. Schwarzkopf Ges. and Dr. P. Schwarzkopf. May 21st, 1924. (234,435.)

27,835. "Electric discharge tubes provided with an incandescent cathode, an anode, and a controlling grid." Naamlooze Vennootschap Philips Gloeilampenfabrieken. November 27th, 1923. (225,541.)

28,455. "Variable resistance devices." L. L. Jones. November 27th, 1924. (240,675.)

30,150. "Process of electrolytically depositing an insulating coating or skin on aluminium." Zaidan Hojin Rikagaku Kenkyujo. December 19th, 1923. (226,536.)

30,523. "Manufacture of tungsten powder by electrolysis." Naamlooze Vennootschap Philips Gloeilampenfabrieken. June 27th, 1924. (236,132.)

30,593. "Electromagnetic system for starting internal-combustion engines." G. Fornaca. December 19th, 1924. (240,682.)

30,600. "Telegraphic relays." J. H. M. Christensen. December 19th, 1924. (240,683.)

1925.

171. "Machines for helically winding wire." Naamlooze Vennootschap Philips Gloeilampenfabrieken. January 2nd, 1925. (228,133.)

286. "Crystal detectors for wireless reception." R. F. Graham. January 5th, 1925. (240,688.)

522. "Electron discharge devices." F. W. Le Tall (Westinghouse Electric and Manufacturing Co.). January 7th, 1925. (240,691.)

3,942. "Magneto contact breaker cams." Etablissements de Dion-Bouton Soc. Anon. February 23rd, 1924. (229,653.)

4,483. "Fine control for variable electric condensers." B. Ross. February 18th, 1925. (240,711.)